Solutions Practical Quiz #1

Name: Partner’s Name

Purpose: - to correctly prepare a solution

 - to correctly make a dilution

 - to use titration to determine the concentration of a solution

**PART 1: Preparing a stock solution.**

1. You and your partner need to make 100mL of a 0.09M NaCl solution.

2. Use this space to determine the mass of NaCl needed.

 Mass NaCl needed:

3. Using a calibrated electronic balance, tare a 50mL beaker and then mass the NaCl you determined in step 2. Don’t forget the uncertainty.

 Mass NaCl used:

4. Using distilled water in a wash bottle, add about 10ml distilled water into the 50mL beaker to dissolve the NaCl. Pour this into a 100mL volumetric flask.

5. Repeat Step 4 four more times (5 times in total).

6. Mix the solution in the volumetric flask to ensure all the solid has dissolved.

7. Using a medicine dropper and distilled water in a small beaker, add distilled water up to the mark. Place the lid on the volumetric flask and invert a few times to mix the solution.

8. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**PART 2: Making a Dilution**

1. From your stock solution, you are to dilute to make 100mL of a 0.055M solution. Use this space to determine the volume of your stock solution needed.

 Volume of Stock Solution needed:

2. Transfer your stock solution into a labeled 250mL beaker. Wash your 100mL volumetric flask.

3. Using the proper sized graduated cylinder measure out the volume of your stock solution needed. Pour this into the volumetric flask and use distilled water to make up to the mark.

 Size of Graduated Cylinder used:

 Volume of stock solution used:

5. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**Part 3: Testing your concentration using titration**

Introduction (from OK State university):

“A silver nitrate solution is used to precipitate out the chlorides in [your] sample. This procedure is complicated by the fact that the dense white precipitate (Silver chloride) does not settle rapidly. It is impossible to tell when all the chlorides from [your sample] have been removed unless an indicator is used to signal complete precipitation by a visual color change. The indicator in the analysis is chromate ion. When all of the chloride ion has [reacted], the chromate ion reacts with the silver ions and forms silver chromate, which is red. The instant a permanent orange tinge appears in the solution (one that does not vanish with mixing), the addition of silver nitrate is stopped. The final solution color should look like that of orange juice.”

1. Write the net ionic equation for the reaction of silver nitrate with sodium chloride. Include all state symbols.

2. Rinse the burette with 5 mL of 0.0500M silver nitrate. Fill burette with silver nitrate up to the 25mL mark. Record this volume.

 Initial Volume AgNO3:

3. Transfer your diluted solution into a labeled 250mL beaker.

4. Wash a 10mL volumetric pipette with 3mL of diluted solution.

5. Use the 10mL volumetric pipette to transfer 10mL of diluted NaCl into a clean, dry 125mL flask.

 Volume of NaCl used:

6. Use this space to determine the number of moles of Cl- in the flask, with uncertainty.

|  |  |
| --- | --- |
| Moles of Cl- Calculation | Uncertainty Calculation |
|  |  |

Moles of Cl-:

7. Use a 10mL graduated cylinder to measure 5mL of 0.1M K2CrO4 and add this to the flask.

8. Add a magnetic stirrer to the flask and place on a stir plate on low stirring speed.

9. Slowly add AgNO3 into the flask. When the orange color begins to stay for about 20s, slow down, and add dropwise. When the orange color persists, stop the titration. Record the final volume of AgNO3.

 Final Volume AgNO3:

10. Use this space to determine the volume of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Volume of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Volume of AgNO3 used:

11. Use this space to determine the moles of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Moles of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Moles of AgNO3 used:

12. Use the mole ratio in the net ionic equation to determine the number of moles of Cl- that were precipitated:

 Mole ratio:

 Mole Cl-:

13. Use the moles of Cl- and the volume of NaCl used to determine the [NaCl] in your diluted solution.

|  |  |
| --- | --- |
| [NaCl] Calculation | Uncertainty Calculation |
|  |  |

[NaCl]:

**Part 4: Conclusion**:

1. Expected (calculated) [NaCl]:

 Experimental value:

 Percentage difference:

2. Percentage difference ­­­ percentage uncertainty

 (> or <)

3. Major source of error:

 (random or systematic)

Solutions Practical Quiz #2

Name: Partner’s Name

Purpose: - to correctly prepare a solution

 - to correctly make a dilution

 - to use titration to determine the concentration of a solution

**PART 1: Preparing a stock solution.**

1. You and your partner need to make 100mL of a 0.10M NaCl solution.

2. Use this space to determine the mass of NaCl needed.

 Mass NaCl needed:

3. Using a calibrated electronic balance, tare a 50mL beaker and then mass the NaCl you determined in step 2. Don’t forget the uncertainty.

 Mass NaCl used:

4. Using distilled water in a wash bottle, add about 10ml distilled water into the 50mL beaker to dissolve the NaCl. Pour this into a 100mL volumetric flask.

5. Repeat Step 4 four more times (5 times in total).

6. Mix the solution in the volumetric flask to ensure all the solid has dissolved.

7. Using a medicine dropper and distilled water in a small beaker, add distilled water up to the mark. Place the lid on the volumetric flask and invert a few times to mix the solution.

8. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**PART 2: Making a Dilution**

1. From your stock solution, you are to dilute to make 100mL of a 0.075M solution. Use this space to determine the volume of your stock solution needed.

 Volume of Stock Solution needed:

2. Transfer your stock solution into a labeled 250mL beaker. Wash your 100mL volumetric flask.

3. Using the proper sized graduated cylinder measure out the volume of your stock solution needed. Pour this into the volumetric flask and use distilled water to make up to the mark.

 Size of Graduated Cylinder used:

 Volume of stock solution used:

5. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**Part 3: Testing your concentration using titration**

Introduction (from OK State university):

“A silver nitrate solution is used to precipitate out the chlorides in [your] sample. This procedure is complicated by the fact that the dense white precipitate (Silver chloride) does not settle rapidly. It is impossible to tell when all the chlorides from [your sample] have been removed unless an indicator is used to signal complete precipitation by a visual color change. The indicator in the analysis is chromate ion. When all of the chloride ion has [reacted], the chromate ion reacts with the silver ions and forms silver chromate, which is red. The instant a permanent orange tinge appears in the solution (one that does not vanish with mixing), the addition of silver nitrate is stopped. The final solution color should look like that of orange juice.”

1. Write the net ionic equation for the reaction of silver nitrate with sodium chloride. Include all state symbols.

2. Rinse the burette with 5 mL of 0.0500M silver nitrate. Fill burette with silver nitrate up to the 25mL mark. Record this volume.

 Initial Volume AgNO3:

3. Transfer your diluted solution into a labeled 250mL beaker.

4. Wash a 10mL volumetric pipette with 3mL of diluted solution.

5. Use the 10mL volumetric pipette to transfer 10mL of diluted NaCl into a clean, dry 125mL flask.

 Volume of NaCl used:

6. Use this space to determine the number of moles of Cl- in the flask, with uncertainty.

|  |  |
| --- | --- |
| Moles of Cl- Calculation | Uncertainty Calculation |
|  |  |

Moles of Cl-:

7. Use a 10mL graduated cylinder to measure 5mL of 0.1M K2CrO4 and add this to the flask.

8. Add a magnetic stirrer to the flask and place on a stir plate on low stirring speed.

9. Slowly add AgNO3 into the flask. When the orange color begins to stay for about 20s, slow down, and add dropwise. When the orange color persists, stop the titration. Record the final volume of AgNO3.

 Final Volume AgNO3:

10. Use this space to determine the volume of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Volume of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Volume of AgNO3 used:

11. Use this space to determine the moles of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Moles of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Moles of AgNO3 used:

12. Use the mole ratio in the net ionic equation to determine the number of moles of Cl- that were precipitated:

 Mole ratio:

 Mole Cl-:

13. Use the moles of Cl- and the volume of NaCl used to determine the [NaCl] in your diluted solution.

|  |  |
| --- | --- |
| [NaCl] Calculation | Uncertainty Calculation |
|  |  |

[NaCl]:

**Part 4: Conclusion**:

1. Expected (calculated) [NaCl]:

 Experimental value:

 Percentage difference:

2. Percentage difference ­­­ percentage uncertainty

 (> or <)

3. Major source of error:

 (random or systematic)

Solutions Practical Quiz #3

Name: Partner’s Name

Purpose: - to correctly prepare a solution

 - to correctly make a dilution

 - to use titration to determine the concentration of a solution

**PART 1: Preparing a stock solution.**

1. You and your partner need to make 100mL of a 0.12M NaCl solution.

2. Use this space to determine the mass of NaCl needed.

 Mass NaCl needed:

3. Using a calibrated electronic balance, tare a 50mL beaker and then mass the NaCl you determined in step 2. Don’t forget the uncertainty.

 Mass NaCl used:

4. Using distilled water in a wash bottle, add about 10ml distilled water into the 50mL beaker to dissolve the NaCl. Pour this into a 100mL volumetric flask.

5. Repeat Step 4 four more times (5 times in total).

6. Mix the solution in the volumetric flask to ensure all the solid has dissolved.

7. Using a medicine dropper and distilled water in a small beaker, add distilled water up to the mark. Place the lid on the volumetric flask and invert a few times to mix the solution.

8. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**PART 2: Making a Dilution**

1. From your stock solution, you are to dilute to make 100mL of a 0.045M solution. Use this space to determine the volume of your stock solution needed.

 Volume of Stock Solution needed:

2. Transfer your stock solution into a labeled 250mL beaker. Wash your 100mL volumetric flask.

3. Using the proper sized graduated cylinder measure out the volume of your stock solution needed. Pour this into the volumetric flask and use distilled water to make up to the mark.

 Size of Graduated Cylinder used:

 Volume of stock solution used:

5. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**Part 3: Testing your concentration using titration**

Introduction (from OK State university):

“A silver nitrate solution is used to precipitate out the chlorides in [your] sample. This procedure is complicated by the fact that the dense white precipitate (Silver chloride) does not settle rapidly. It is impossible to tell when all the chlorides from [your sample] have been removed unless an indicator is used to signal complete precipitation by a visual color change. The indicator in the analysis is chromate ion. When all of the chloride ion has [reacted], the chromate ion reacts with the silver ions and forms silver chromate, which is red. The instant a permanent orange tinge appears in the solution (one that does not vanish with mixing), the addition of silver nitrate is stopped. The final solution color should look like that of orange juice.”

1. Write the net ionic equation for the reaction of silver nitrate with sodium chloride. Include all state symbols.

2. Rinse the burette with 5 mL of 0.0500M silver nitrate. Fill burette with silver nitrate up to the 25mL mark. Record this volume.

 Initial Volume AgNO3:

3. Transfer your diluted solution into a labeled 250mL beaker.

4. Wash a 10mL volumetric pipette with 3mL of diluted solution.

5. Use the 10mL volumetric pipette to transfer 10mL of diluted NaCl into a clean, dry 125mL flask.

 Volume of NaCl used:

6. Use this space to determine the number of moles of Cl- in the flask, with uncertainty.

|  |  |
| --- | --- |
| Moles of Cl- Calculation | Uncertainty Calculation |
|  |  |

Moles of Cl-:

7. Use a 10mL graduated cylinder to measure 5mL of 0.1M K2CrO4 and add this to the flask.

8. Add a magnetic stirrer to the flask and place on a stir plate on low stirring speed.

9. Slowly add AgNO3 into the flask. When the orange color begins to stay for about 20s, slow down, and add dropwise. When the orange color persists, stop the titration. Record the final volume of AgNO3.

 Final Volume AgNO3:

10. Use this space to determine the volume of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Volume of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Volume of AgNO3 used:

11. Use this space to determine the moles of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Moles of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Moles of AgNO3 used:

12. Use the mole ratio in the net ionic equation to determine the number of moles of Cl- that were precipitated:

 Mole ratio:

 Mole Cl-:

13. Use the moles of Cl- and the volume of NaCl used to determine the [NaCl] in your diluted solution.

|  |  |
| --- | --- |
| [NaCl] Calculation | Uncertainty Calculation |
|  |  |

[NaCl]:

**Part 4: Conclusion**:

1. Expected (calculated) [NaCl]:

 Experimental value:

 Percentage difference:

2. Percentage difference ­­­ percentage uncertainty

 (> or <)

3. Major source of error:

 (random or systematic)

Solutions Practical Quiz #4

Name: Partner’s Name

Purpose: - to correctly prepare a solution

 - to correctly make a dilution

 - to use titration to determine the concentration of a solution

**PART 1: Preparing a stock solution.**

1. You and your partner need to make 100mL of a 0.13M NaCl solution.

2. Use this space to determine the mass of NaCl needed.

 Mass NaCl needed:

3. Using a calibrated electronic balance, tare a 50mL beaker and then mass the NaCl you determined in step 2. Don’t forget the uncertainty.

 Mass NaCl used:

4. Using distilled water in a wash bottle, add about 10ml distilled water into the 50mL beaker to dissolve the NaCl. Pour this into a 100mL volumetric flask.

5. Repeat Step 4 four more times (5 times in total).

6. Mix the solution in the volumetric flask to ensure all the solid has dissolved.

7. Using a medicine dropper and distilled water in a small beaker, add distilled water up to the mark. Place the lid on the volumetric flask and invert a few times to mix the solution.

8. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**PART 2: Making a Dilution**

1. From your stock solution, you are to dilute to make 100mL of a 0.050M solution. Use this space to determine the volume of your stock solution needed.

 Volume of Stock Solution needed:

2. Transfer your stock solution into a labeled 250mL beaker. Wash your 100mL volumetric flask.

3. Using the proper sized graduated cylinder measure out the volume of your stock solution needed. Pour this into the volumetric flask and use distilled water to make up to the mark.

 Size of Graduated Cylinder used:

 Volume of stock solution used:

5. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**Part 3: Testing your concentration using titration**

Introduction (from OK State university):

“A silver nitrate solution is used to precipitate out the chlorides in [your] sample. This procedure is complicated by the fact that the dense white precipitate (Silver chloride) does not settle rapidly. It is impossible to tell when all the chlorides from [your sample] have been removed unless an indicator is used to signal complete precipitation by a visual color change. The indicator in the analysis is chromate ion. When all of the chloride ion has [reacted], the chromate ion reacts with the silver ions and forms silver chromate, which is red. The instant a permanent orange tinge appears in the solution (one that does not vanish with mixing), the addition of silver nitrate is stopped. The final solution color should look like that of orange juice.”

1. Write the net ionic equation for the reaction of silver nitrate with sodium chloride. Include all state symbols.

2. Rinse the burette with 5 mL of 0.0500M silver nitrate. Fill burette with silver nitrate up to the 25mL mark. Record this volume.

 Initial Volume AgNO3:

3. Transfer your diluted solution into a labeled 250mL beaker.

4. Wash a 10mL volumetric pipette with 3mL of diluted solution.

5. Use the 10mL volumetric pipette to transfer 10mL of diluted NaCl into a clean, dry 125mL flask.

 Volume of NaCl used:

6. Use this space to determine the number of moles of Cl- in the flask, with uncertainty.

|  |  |
| --- | --- |
| Moles of Cl- Calculation | Uncertainty Calculation |
|  |  |

Moles of Cl-:

7. Use a 10mL graduated cylinder to measure 5mL of 0.1M K2CrO4 and add this to the flask.

8. Add a magnetic stirrer to the flask and place on a stir plate on low stirring speed.

9. Slowly add AgNO3 into the flask. When the orange color begins to stay for about 20s, slow down, and add dropwise. When the orange color persists, stop the titration. Record the final volume of AgNO3.

 Final Volume AgNO3:

10. Use this space to determine the volume of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Volume of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Volume of AgNO3 used:

11. Use this space to determine the moles of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Moles of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Moles of AgNO3 used:

12. Use the mole ratio in the net ionic equation to determine the number of moles of Cl- that were precipitated:

 Mole ratio:

 Mole Cl-:

13. Use the moles of Cl- and the volume of NaCl used to determine the [NaCl] in your diluted solution.

|  |  |
| --- | --- |
| [NaCl] Calculation | Uncertainty Calculation |
|  |  |

[NaCl]:

**Part 4: Conclusion**:

1. Expected (calculated) [NaCl]:

 Experimental value:

 Percentage difference:

2. Percentage difference ­­­ percentage uncertainty

 (> or <)

3. Major source of error:

 (random or systematic)

Solutions Practical Quiz #5

Name: Partner’s Name

Purpose: - to correctly prepare a solution

 - to correctly make a dilution

 - to use titration to determine the concentration of a solution

**PART 1: Preparing a stock solution.**

1. You and your partner need to make 100mL of a 0.15M NaCl solution.

2. Use this space to determine the mass of NaCl needed.

 Mass NaCl needed:

3. Using a calibrated electronic balance, tare a 50mL beaker and then mass the NaCl you determined in step 2. Don’t forget the uncertainty.

 Mass NaCl used:

4. Using distilled water in a wash bottle, add about 10ml distilled water into the 50mL beaker to dissolve the NaCl. Pour this into a 100mL volumetric flask.

5. Repeat Step 4 four more times (5 times in total).

6. Mix the solution in the volumetric flask to ensure all the solid has dissolved.

7. Using a medicine dropper and distilled water in a small beaker, add distilled water up to the mark. Place the lid on the volumetric flask and invert a few times to mix the solution.

8. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**PART 2: Making a Dilution**

1. From your stock solution, you are to dilute to make 100mL of a 0.085M solution. Use this space to determine the volume of your stock solution needed.

 Volume of Stock Solution needed:

2. Transfer your stock solution into a labeled 250mL beaker. Wash your 100mL volumetric flask.

3. Using the proper sized graduated cylinder measure out the volume of your stock solution needed. Pour this into the volumetric flask and use distilled water to make up to the mark.

 Size of Graduated Cylinder used:

 Volume of stock solution used:

5. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**Part 3: Testing your concentration using titration**

Introduction (from OK State university):

“A silver nitrate solution is used to precipitate out the chlorides in [your] sample. This procedure is complicated by the fact that the dense white precipitate (Silver chloride) does not settle rapidly. It is impossible to tell when all the chlorides from [your sample] have been removed unless an indicator is used to signal complete precipitation by a visual color change. The indicator in the analysis is chromate ion. When all of the chloride ion has [reacted], the chromate ion reacts with the silver ions and forms silver chromate, which is red. The instant a permanent orange tinge appears in the solution (one that does not vanish with mixing), the addition of silver nitrate is stopped. The final solution color should look like that of orange juice.”

1. Write the net ionic equation for the reaction of silver nitrate with sodium chloride. Include all state symbols.

2. Rinse the burette with 5 mL of 0.0500M silver nitrate. Fill burette with silver nitrate up to the 25mL mark. Record this volume.

 Initial Volume AgNO3:

3. Transfer your diluted solution into a labeled 250mL beaker.

4. Wash a 10mL volumetric pipette with 3mL of diluted solution.

5. Use the 10mL volumetric pipette to transfer 10mL of diluted NaCl into a clean, dry 125mL flask.

 Volume of NaCl used:

6. Use this space to determine the number of moles of Cl- in the flask, with uncertainty.

|  |  |
| --- | --- |
| Moles of Cl- Calculation | Uncertainty Calculation |
|  |  |

Moles of Cl-:

7. Use a 10mL graduated cylinder to measure 5mL of 0.1M K2CrO4 and add this to the flask.

8. Add a magnetic stirrer to the flask and place on a stir plate on low stirring speed.

9. Slowly add AgNO3 into the flask. When the orange color begins to stay for about 20s, slow down, and add dropwise. When the orange color persists, stop the titration. Record the final volume of AgNO3.

 Final Volume AgNO3:

10. Use this space to determine the volume of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Volume of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Volume of AgNO3 used:

11. Use this space to determine the moles of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Moles of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Moles of AgNO3 used:

12. Use the mole ratio in the net ionic equation to determine the number of moles of Cl- that were precipitated:

 Mole ratio:

 Mole Cl-:

13. Use the moles of Cl- and the volume of NaCl used to determine the [NaCl] in your diluted solution.

|  |  |
| --- | --- |
| [NaCl] Calculation | Uncertainty Calculation |
|  |  |

[NaCl]:

**Part 4: Conclusion**:

1. Expected (calculated) [NaCl]:

 Experimental value:

 Percentage difference:

2. Percentage difference ­­­ percentage uncertainty

 (> or <)

3. Major source of error:

 (random or systematic)

Solutions Practical Quiz #6

Name: Partner’s Name

Purpose: - to correctly prepare a solution

 - to correctly make a dilution

 - to use titration to determine the concentration of a solution

**PART 1: Preparing a stock solution.**

1. You and your partner need to make 100mL of a 0.16M NaCl solution.

2. Use this space to determine the mass of NaCl needed.

 Mass NaCl needed:

3. Using a calibrated electronic balance, tare a 50mL beaker and then mass the NaCl you determined in step 2. Don’t forget the uncertainty.

 Mass NaCl used:

4. Using distilled water in a wash bottle, add about 10ml distilled water into the 50mL beaker to dissolve the NaCl. Pour this into a 100mL volumetric flask.

5. Repeat Step 4 four more times (5 times in total).

6. Mix the solution in the volumetric flask to ensure all the solid has dissolved.

7. Using a medicine dropper and distilled water in a small beaker, add distilled water up to the mark. Place the lid on the volumetric flask and invert a few times to mix the solution.

8. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**PART 2: Making a Dilution**

1. From your stock solution, you are to dilute to make 100mL of a 0.060M solution. Use this space to determine the volume of your stock solution needed.

 Volume of Stock Solution needed:

2. Transfer your stock solution into a labeled 250mL beaker. Wash your 100mL volumetric flask.

3. Using the proper sized graduated cylinder measure out the volume of your stock solution needed. Pour this into the volumetric flask and use distilled water to make up to the mark.

 Size of Graduated Cylinder used:

 Volume of stock solution used:

5. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**Part 3: Testing your concentration using titration**

Introduction (from OK State university):

“A silver nitrate solution is used to precipitate out the chlorides in [your] sample. This procedure is complicated by the fact that the dense white precipitate (Silver chloride) does not settle rapidly. It is impossible to tell when all the chlorides from [your sample] have been removed unless an indicator is used to signal complete precipitation by a visual color change. The indicator in the analysis is chromate ion. When all of the chloride ion has [reacted], the chromate ion reacts with the silver ions and forms silver chromate, which is red. The instant a permanent orange tinge appears in the solution (one that does not vanish with mixing), the addition of silver nitrate is stopped. The final solution color should look like that of orange juice.”

1. Write the net ionic equation for the reaction of silver nitrate with sodium chloride. Include all state symbols.

2. Rinse the burette with 5 mL of 0.0500M silver nitrate. Fill burette with silver nitrate up to the 25mL mark. Record this volume.

 Initial Volume AgNO3:

3. Transfer your diluted solution into a labeled 250mL beaker.

4. Wash a 10mL volumetric pipette with 3mL of diluted solution.

5. Use the 10mL volumetric pipette to transfer 10mL of diluted NaCl into a clean, dry 125mL flask.

 Volume of NaCl used:

6. Use this space to determine the number of moles of Cl- in the flask, with uncertainty.

|  |  |
| --- | --- |
| Moles of Cl- Calculation | Uncertainty Calculation |
|  |  |

Moles of Cl-:

7. Use a 10mL graduated cylinder to measure 5mL of 0.1M K2CrO4 and add this to the flask.

8. Add a magnetic stirrer to the flask and place on a stir plate on low stirring speed.

9. Slowly add AgNO3 into the flask. When the orange color begins to stay for about 20s, slow down, and add dropwise. When the orange color persists, stop the titration. Record the final volume of AgNO3.

 Final Volume AgNO3:

10. Use this space to determine the volume of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Volume of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Volume of AgNO3 used:

11. Use this space to determine the moles of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Moles of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Moles of AgNO3 used:

12. Use the mole ratio in the net ionic equation to determine the number of moles of Cl- that were precipitated:

 Mole ratio:

 Mole Cl-:

13. Use the moles of Cl- and the volume of NaCl used to determine the [NaCl] in your diluted solution.

|  |  |
| --- | --- |
| [NaCl] Calculation | Uncertainty Calculation |
|  |  |

[NaCl]:

**Part 4: Conclusion**:

1. Expected (calculated) [NaCl]:

 Experimental value:

 Percentage difference:

2. Percentage difference ­­­ percentage uncertainty

 (> or <)

3. Major source of error:

 (random or systematic)

Solutions Practical Quiz #7

Name: Partner’s Name

Purpose: - to correctly prepare a solution

 - to correctly make a dilution

 - to use titration to determine the concentration of a solution

**PART 1: Preparing a stock solution.**

1. You and your partner need to make 100mL of a 0.18M NaCl solution.

2. Use this space to determine the mass of NaCl needed.

 Mass NaCl needed:

3. Using a calibrated electronic balance, tare a 50mL beaker and then mass the NaCl you determined in step 2. Don’t forget the uncertainty.

 Mass NaCl used:

4. Using distilled water in a wash bottle, add about 10ml distilled water into the 50mL beaker to dissolve the NaCl. Pour this into a 100mL volumetric flask.

5. Repeat Step 4 four more times (5 times in total).

6. Mix the solution in the volumetric flask to ensure all the solid has dissolved.

7. Using a medicine dropper and distilled water in a small beaker, add distilled water up to the mark. Place the lid on the volumetric flask and invert a few times to mix the solution.

8. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**PART 2: Making a Dilution**

1. From your stock solution, you are to dilute to make 100mL of a 0.065M solution. Use this space to determine the volume of your stock solution needed.

 Volume of Stock Solution needed:

2. Transfer your stock solution into a labeled 250mL beaker. Wash your 100mL volumetric flask.

3. Using the proper sized graduated cylinder measure out the volume of your stock solution needed. Pour this into the volumetric flask and use distilled water to make up to the mark.

 Size of Graduated Cylinder used:

 Volume of stock solution used:

5. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**Part 3: Testing your concentration using titration**

Introduction (from OK State university):

“A silver nitrate solution is used to precipitate out the chlorides in [your] sample. This procedure is complicated by the fact that the dense white precipitate (Silver chloride) does not settle rapidly. It is impossible to tell when all the chlorides from [your sample] have been removed unless an indicator is used to signal complete precipitation by a visual color change. The indicator in the analysis is chromate ion. When all of the chloride ion has [reacted], the chromate ion reacts with the silver ions and forms silver chromate, which is red. The instant a permanent orange tinge appears in the solution (one that does not vanish with mixing), the addition of silver nitrate is stopped. The final solution color should look like that of orange juice.”

1. Write the net ionic equation for the reaction of silver nitrate with sodium chloride. Include all state symbols.

2. Rinse the burette with 5 mL of 0.0500M silver nitrate. Fill burette with silver nitrate up to the 25mL mark. Record this volume.

 Initial Volume AgNO3:

3. Transfer your diluted solution into a labeled 250mL beaker.

4. Wash a 10mL volumetric pipette with 3mL of diluted solution.

5. Use the 10mL volumetric pipette to transfer 10mL of diluted NaCl into a clean, dry 125mL flask.

 Volume of NaCl used:

6. Use this space to determine the number of moles of Cl- in the flask, with uncertainty.

|  |  |
| --- | --- |
| Moles of Cl- Calculation | Uncertainty Calculation |
|  |  |

Moles of Cl-:

7. Use a 10mL graduated cylinder to measure 5mL of 0.1M K2CrO4 and add this to the flask.

8. Add a magnetic stirrer to the flask and place on a stir plate on low stirring speed.

9. Slowly add AgNO3 into the flask. When the orange color begins to stay for about 20s, slow down, and add dropwise. When the orange color persists, stop the titration. Record the final volume of AgNO3.

 Final Volume AgNO3:

10. Use this space to determine the volume of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Volume of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Volume of AgNO3 used:

11. Use this space to determine the moles of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Moles of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Moles of AgNO3 used:

12. Use the mole ratio in the net ionic equation to determine the number of moles of Cl- that were precipitated:

 Mole ratio:

 Mole Cl-:

13. Use the moles of Cl- and the volume of NaCl used to determine the [NaCl] in your diluted solution.

|  |  |
| --- | --- |
| [NaCl] Calculation | Uncertainty Calculation |
|  |  |

[NaCl]:

**Part 4: Conclusion**:

1. Expected (calculated) [NaCl]:

 Experimental value:

 Percentage difference:

2. Percentage difference ­­­ percentage uncertainty

 (> or <)

3. Major source of error:

 (random or systematic)

Solutions Practical Quiz #8

Name: Partner’s Name

Purpose: - to correctly prepare a solution

 - to correctly make a dilution

 - to use titration to determine the concentration of a solution

**PART 1: Preparing a stock solution.**

1. You and your partner need to make 100mL of a 0.19M NaCl solution.

2. Use this space to determine the mass of NaCl needed.

 Mass NaCl needed:

3. Using a calibrated electronic balance, tare a 50mL beaker and then mass the NaCl you determined in step 2. Don’t forget the uncertainty.

 Mass NaCl used:

4. Using distilled water in a wash bottle, add about 10ml distilled water into the 50mL beaker to dissolve the NaCl. Pour this into a 100mL volumetric flask.

5. Repeat Step 4 four more times (5 times in total).

6. Mix the solution in the volumetric flask to ensure all the solid has dissolved.

7. Using a medicine dropper and distilled water in a small beaker, add distilled water up to the mark. Place the lid on the volumetric flask and invert a few times to mix the solution.

8. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**PART 2: Making a Dilution**

1. From your stock solution, you are to dilute to make 100mL of a 0.070M solution. Use this space to determine the volume of your stock solution needed.

 Volume of Stock Solution needed:

2. Transfer your stock solution into a labeled 250mL beaker. Wash your 100mL volumetric flask.

3. Using the proper sized graduated cylinder measure out the volume of your stock solution needed. Pour this into the volumetric flask and use distilled water to make up to the mark.

 Size of Graduated Cylinder used:

 Volume of stock solution used:

5. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**Part 3: Testing your concentration using titration**

Introduction (from OK State university):

“A silver nitrate solution is used to precipitate out the chlorides in [your] sample. This procedure is complicated by the fact that the dense white precipitate (Silver chloride) does not settle rapidly. It is impossible to tell when all the chlorides from [your sample] have been removed unless an indicator is used to signal complete precipitation by a visual color change. The indicator in the analysis is chromate ion. When all of the chloride ion has [reacted], the chromate ion reacts with the silver ions and forms silver chromate, which is red. The instant a permanent orange tinge appears in the solution (one that does not vanish with mixing), the addition of silver nitrate is stopped. The final solution color should look like that of orange juice.”

1. Write the net ionic equation for the reaction of silver nitrate with sodium chloride. Include all state symbols.

2. Rinse the burette with 5 mL of 0.0500M silver nitrate. Fill burette with silver nitrate up to the 25mL mark. Record this volume.

 Initial Volume AgNO3:

3. Transfer your diluted solution into a labeled 250mL beaker.

4. Wash a 10mL volumetric pipette with 3mL of diluted solution.

5. Use the 10mL volumetric pipette to transfer 10mL of diluted NaCl into a clean, dry 125mL flask.

 Volume of NaCl used:

6. Use this space to determine the number of moles of Cl- in the flask, with uncertainty.

|  |  |
| --- | --- |
| Moles of Cl- Calculation | Uncertainty Calculation |
|  |  |

Moles of Cl-:

7. Use a 10mL graduated cylinder to measure 5mL of 0.1M K2CrO4 and add this to the flask.

8. Add a magnetic stirrer to the flask and place on a stir plate on low stirring speed.

9. Slowly add AgNO3 into the flask. When the orange color begins to stay for about 20s, slow down, and add dropwise. When the orange color persists, stop the titration. Record the final volume of AgNO3.

 Final Volume AgNO3:

10. Use this space to determine the volume of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Volume of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Volume of AgNO3 used:

11. Use this space to determine the moles of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Moles of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Moles of AgNO3 used:

12. Use the mole ratio in the net ionic equation to determine the number of moles of Cl- that were precipitated:

 Mole ratio:

 Mole Cl-:

13. Use the moles of Cl- and the volume of NaCl used to determine the [NaCl] in your diluted solution.

|  |  |
| --- | --- |
| [NaCl] Calculation | Uncertainty Calculation |
|  |  |

[NaCl]:

**Part 4: Conclusion**:

1. Expected (calculated) [NaCl]:

 Experimental value:

 Percentage difference:

2. Percentage difference ­­­ percentage uncertainty

 (> or <)

3. Major source of error:

 (random or systematic)

Solutions Practical Quiz #9

Name: Partner’s Name

Purpose: - to correctly prepare a solution

 - to correctly make a dilution

 - to use titration to determine the concentration of a solution

**PART 1: Preparing a stock solution.**

1. You and your partner need to make 100mL of a 0.20M NaCl solution.

2. Use this space to determine the mass of NaCl needed.

 Mass NaCl needed:

3. Using a calibrated electronic balance, tare a 50mL beaker and then mass the NaCl you determined in step 2. Don’t forget the uncertainty.

 Mass NaCl used:

4. Using distilled water in a wash bottle, add about 10ml distilled water into the 50mL beaker to dissolve the NaCl. Pour this into a 100mL volumetric flask.

5. Repeat Step 4 four more times (5 times in total).

6. Mix the solution in the volumetric flask to ensure all the solid has dissolved.

7. Using a medicine dropper and distilled water in a small beaker, add distilled water up to the mark. Place the lid on the volumetric flask and invert a few times to mix the solution.

8. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**PART 2: Making a Dilution**

1. From your stock solution, you are to dilute to make 100mL of a 0.080M solution. Use this space to determine the volume of your stock solution needed.

 Volume of Stock Solution needed:

2. Transfer your stock solution into a labeled 250mL beaker. Wash your 100mL volumetric flask.

3. Using the proper sized graduated cylinder measure out the volume of your stock solution needed. Pour this into the volumetric flask and use distilled water to make up to the mark.

 Size of Graduated Cylinder used:

 Volume of stock solution used:

5. Use this space to determine the concentration of your solution, with uncertainty.

|  |  |
| --- | --- |
| Concentration Calculation | Uncertainty Calculation |
|  |  |

Concentration of solution:

**Part 3: Testing your concentration using titration**

Introduction (from OK State university):

“A silver nitrate solution is used to precipitate out the chlorides in [your] sample. This procedure is complicated by the fact that the dense white precipitate (Silver chloride) does not settle rapidly. It is impossible to tell when all the chlorides from [your sample] have been removed unless an indicator is used to signal complete precipitation by a visual color change. The indicator in the analysis is chromate ion. When all of the chloride ion has [reacted], the chromate ion reacts with the silver ions and forms silver chromate, which is red. The instant a permanent orange tinge appears in the solution (one that does not vanish with mixing), the addition of silver nitrate is stopped. The final solution color should look like that of orange juice.”

1. Write the net ionic equation for the reaction of silver nitrate with sodium chloride. Include all state symbols.

2. Rinse the burette with 5 mL of 0.0500M silver nitrate. Fill burette with silver nitrate up to the 25mL mark. Record this volume.

 Initial Volume AgNO3:

3. Transfer your diluted solution into a labeled 250mL beaker.

4. Wash a 10mL volumetric pipette with 3mL of diluted solution.

5. Use the 10mL volumetric pipette to transfer 10mL of diluted NaCl into a clean, dry 125mL flask.

 Volume of NaCl used:

6. Use this space to determine the number of moles of Cl- in the flask, with uncertainty.

|  |  |
| --- | --- |
| Moles of Cl- Calculation | Uncertainty Calculation |
|  |  |

Moles of Cl-:

7. Use a 10mL graduated cylinder to measure 5mL of 0.1M K2CrO4 and add this to the flask.

8. Add a magnetic stirrer to the flask and place on a stir plate on low stirring speed.

9. Slowly add AgNO3 into the flask. When the orange color begins to stay for about 20s, slow down, and add dropwise. When the orange color persists, stop the titration. Record the final volume of AgNO3.

 Final Volume AgNO3:

10. Use this space to determine the volume of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Volume of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Volume of AgNO3 used:

11. Use this space to determine the moles of AgNO3 used, with uncertainty.

|  |  |
| --- | --- |
| Moles of AgNO3 Calculation | Uncertainty Calculation |
|  |  |

Moles of AgNO3 used:

12. Use the mole ratio in the net ionic equation to determine the number of moles of Cl- that were precipitated:

 Mole ratio:

 Mole Cl-:

13. Use the moles of Cl- and the volume of NaCl used to determine the [NaCl] in your diluted solution.

|  |  |
| --- | --- |
| [NaCl] Calculation | Uncertainty Calculation |
|  |  |

[NaCl]:

**Part 4: Conclusion**:

1. Expected (calculated) [NaCl]:

 Experimental value:

 Percentage difference:

2. Percentage difference ­­­ percentage uncertainty

 (> or <)

3. Major source of error:

 (random or systematic)