

How was Experiment 4 Graded?

Chem 151 Fall 2009

III.A. Preparation and Extraction of Halogens (16 pts. possible)

4 points were rewarded for each of the balanced net ionic equation in the preparation of Cl_2 . A balanced net ionic equation must be balanced in both mass and net charges.



4 points were rewarded for each correct calculation to obtain the moles of NaClO in solution and moles of Cl_2 .

$$\text{Mass of NaClO} = (1.0 \text{ mL})(1.0 \text{ g/mL})(5.0\%) = 0.050 \text{ g}$$

$$\text{Moles of NaClO} = (0.050 \text{ g}) \left(\frac{1 \text{ mol NaClO}}{74.44 \text{ g}} \right) = 0.00067 \text{ mol}$$

$$\text{Moles of Cl}_2 = \text{moles of NaClO} = 0.00067 \text{ mol}$$

2 points were rewarded for the correct formula of calcium triiodide, $\text{Ca}(\text{I}_3)_2$

2 points were rewarded for the correct color of a $\text{Ca}(\text{I}_3)_2$ solution, which is the color of the KI_3 solution in lab.

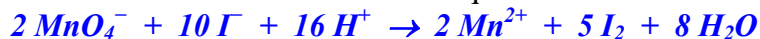
III.B. Reaction of Common Oxidizing Agents with Bromide and Iodide (24 points possible)

10 points were rewarded for reporting the correct colors in the aqueous layers and cyclohexane layers in steps 15, 16, and 17. 2 points were deducted for each incorrect answer not to exceed 10 total points.

4 points were rewarded for making the correct conclusion of redox reactions taken place.

2 points were awarded for correct identification of substances responsible for the color shown in the Solutions in Steps 16 and 17.

6 points were awarded for the correct balanced net ionic equation of the reaction between permanganate and iodide.



Or



III.C. Reaction of Halogens and Halides (20 points possible)

4 pts. were rewarded for obtaining the correct conclusion and giving the correct balanced net ionic equation for the reaction of halogens and halides.



2 pts. were awarded for each correct ranking of the strengths of the oxidizing agents and reducing agents.

Note that MnO_4^- reacts with both I^- and Br^- to produce I_2 and Br_2 . This shows that MnO_4^- is a stronger oxidizing agent than both I_2 and Br_2 . However, H_2O_2 reacted with I^- but not with Br^- . This showed that H_2O_2 is a stronger oxidizing agent than I_2 but weaker than Br_2 . Hence, with the given concentrations in this experiment, the ranking of oxidizing strength is: $\text{I}_2 < \text{H}_2\text{O}_2 < \text{Br}_2 < \text{MnO}_4^-$.

Complete Prelab Assignment and notebook pages (20 points possible)

Two points were deducted for each of the following violations:

- Missing/Incorrect ChemID
- Using of pencil to write the report/notebook pages
- Using a red pen to write the report/notebook pages
- Using of white-outs in report/notebook pages
- Scribbling of errors in notebook pages

Answers to Pre-lab Assignment

3. In the box below, write a balance net ionic equation to illustrate the reaction that occurs in Step 10 of the PROCEDURE.



2 pts.

4. In the boxes below, enter the number of moles of NaBr and NaBrO₃ added to the 5" test tube in Step 10. Which reagent will be in excess amount when the reaction is complete? Circle your answer and show work leading to the answer.

Moles of NaBr added = 0.0015 moles 1 pt.

Moles of NaBrO₃ added = 0.00025 moles 1 pt.

The excess reagent is (NaBr/NaBrO₃) 1 pt.

$$\text{Moles of NaBr} = (0.0050 \text{ L})(0.30 \text{ mol/L}) = 0.0015 \text{ mol}$$

$$\text{Moles of NaBrO}_3 = (0.0010 \text{ L})(0.25 \text{ mol/L}) = 0.00025 \text{ mol}$$

Moles of NaBr needed for the reaction with 0.00025 mol of NaBrO₃ is:

$$(0.00025 \text{ mol NaBrO}_3) \left(\frac{5 \text{ mol NaBr}}{1 \text{ mol NaBrO}_3} \right) = 0.00125 \text{ mol NaBr}$$

Since 0.0015 moles of NaBr is added in Step 10, there is excess NaBr after the reaction.

5. In Step 12 of the PROCEDURE, what would be the color of the cyclohexane layer when the solution settles? What substance would be extracted into cyclohexane? Enter your answer in the boxes.

Purple

1 pt.

I₂

1 pt.