

This exam consists of 4 pages. Make sure you have one of each. Print your name at the top of each page now. A fifth page contains a periodic chart. You may tear it off and use it for scratch paper. Show your work on calculations, including unit conversions, and give answers in the correct units and appropriate number of significant figures.

In problems involving molecular and formula weights, you may use values rounded to the nearest 0.1 amu.

If anything confuses you or is not clear, raise your hand and ask!

Page **Points**

1 _____

2 _____

3 _____

4 _____

Total _____

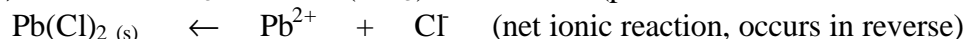
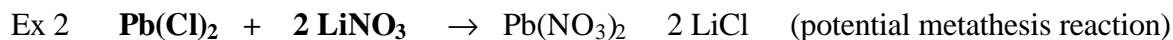
Points

- (18) 1. For the potential reactants in water below:
- (a) Write the **balanced** potential metathesis equation in the **molecular form** showing the correct formula for the potential metathesis products.
 - (b) Write a balanced **net ionic equation**, (or indicate **no net ionic equation** if there is none.)
 - (c) If there is a net ionic equation, state whether the reaction should occur in the **forward** or **reverse** direction.
 - (d) Be sure to indicate precipitates with (s), gases with (g), and weak electrolytes by writing the molecular formula rather than the ions

Examples:



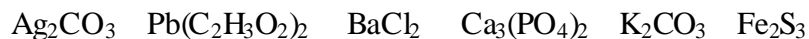
No net ionic reaction



(6) 2. Classify as **strong acid, weak acid, strong base, weak base**, or **salt**:



(6) 3. **Circle** the following compounds which are **insoluble** in water:



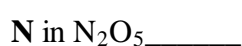
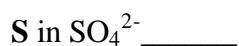
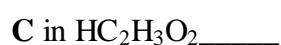
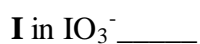
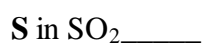
(12) 4. A 5.25 g sample of $\text{Mg}(\text{OH})_2$ suspended in water required 48.5 mL of a solution of HCl to completely react with it in a titration experiment.

(a) Write the balanced molecular equation for the reaction.

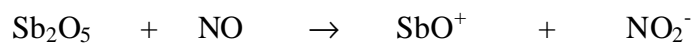
(b) Write the net ionic equation for the reaction.

(c) Calculate the molarity of the HCl solution. (Show your work).

(9) 5. Give the oxidation number of the indicated element in each of the following compounds or ions:



(13) 6. Given the following oxidation-reduction reaction:



- (a) Identify: The reagent being oxidized _____
- The reagent being reduced _____
- The oxidizing agent _____
- The reducing agent _____

(b) Balance the equation **in acidic solution**.

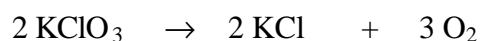
(6) 7. State **Boyle's Law** in its mathematical form

(8) 8. A tank of gas with a volume of 2.5 L is under a pressure of 215 atmospheres at 0 °C. If the gas is all used to inflate a life-raft with a volume 495 L at 30 °C, what would the pressure be in the life raft?

For problems 9 and 10, use $R = 0.08206 \text{ L-atm-mol}^{-1}\text{-K}^{-1}$

- (8) 9. A volatile liquid was vaporized at 80°C and 740 torr, and the density of the vapor was measured as 2.49 g/L. What is the molecular weight of the substance?

- (14) 10. Oxygen gas can be produced by the decomposition of potassium chlorate in the presence of a catalyst, according to the following reaction:



A sample of KClO_3 was decomposed in this fashion, and the oxygen was collected over water by displacing the water from an upended container. The volume of the oxygen collected was 2.65 L at a temperature of 20°C . The atmospheric pressure was 755 torr, and the vapor pressure of water at 20°C is 17.5 torr. Calculate the **moles** of KClO_3 and the **grams** of KClO_3 in the sample. (Show your work).