

HW #4– Due April 21

Chapters 11-13, 8 points total.

Questions / Problems – Show your work where necessary!

1. What is the heat of fusion? The heat of vaporization? Distinguish between them.
2. What happens to the temperature of water as it is boiling? Explain your answer in terms of latent heat.
3. How are the particles of a solid arranged differently than the particles in a liquid?
4. Name the following compounds: a) Cr_4O_7 b) LiBr c) CaS d) BP
5. Helium, He , is a gas and the second element in the periodic table. Rather than being placed right next to the only other element in the first period, hydrogen (H), helium is placed on the far right. Explain why.
6. How many total atoms are there in one molecule of H_3PO_4 ? How many atoms of each element are there in the same molecule?
7. How much heat (in Joules) is needed to melt 1 gram of ice?
8. What does the chemical formula of a substance tell us about that substance?
9. How does an ion differ from an atom? To become a negative ion, does an atom lose or gain electrons? What happens to make a positive ion?
10. How many electrons can occupy the first shell? How many can occupy the second shell?
11. What force holds atoms together in an ionic bond? A covalent bond?
12. Describe how solubility changes with temperature.
13. How many atoms are in a mole? How does the concept of a mole relate to the molarity of a solution? To the gram atomic weight of an atom? To the gram molecular weight of a compound?
14. Water, H_2O , and methane, CH_4 , have about the same mass and differ by only one type of atom. Why is the boiling point of water so much higher than that of methane?
15. Which electrons are represented by an electron dot structure?
16. Barium ions combine with nitrogen ions. What would the chemical formula be?
17. At 20°C which is more concentrated – a saturated solution of sodium nitrate or a saturated solution of sodium chloride (see Figure 12.47 on p.327).
18. Do problem 49 on p.372.
19. What happens to the pH of an acidic solution as water is added?
20. Many of the smelly molecules of cooked fish are alkaline compounds. How might these smelly compounds be transformed into less smelly salts just before you eat the fish?
21. For the following chemical equations, identify which are oxidized and which are reduced:
 - a. $\text{I}_2 + 2 \text{Br}^{-1} \rightarrow 2 \text{I}^{-1} + \text{Br}_2$
 - b. $\text{Sn}^{+2} + 2 \text{Ag} \rightarrow \text{Sn} + 2 \text{Ag}^{+1}$
 - c. $2 \text{H}_2\text{S} + 3 \text{O}_2 \rightarrow 2 \text{H}_2\text{O} + 2 \text{SO}_2$
22. What does pH mean? Which pH is “neutral”? Which range of pH is acidic? Which range of pH is basic?
23. Identify the acid-base behavior of each substance in these reactions:
 - a. $\text{H}_3\text{O}^+ + \text{Cl}^- \leftrightarrow \text{H}_2\text{O} + \text{HCl}$
 - b. $\text{H}_2\text{PO}_4^{-1} + \text{H}_2\text{O} \leftrightarrow \text{H}_3\text{O} + \text{HPO}_4^{-2}$
24. What is released by an exothermic reaction? What is absorbed by an endothermic reaction?
25. What would be the concentration of hydronium ions in a solution with a pH of -3? Why is such a solution impossible to prepare?