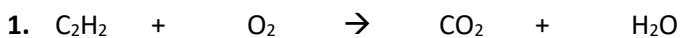


## 2<sup>nd</sup> Semester Chemistry Final Review Problems

Balance and classify the following reactions:



What do the following symbols mean in terms of state of matter of a compound?

3. g

5. aq

4. l

6. ppt

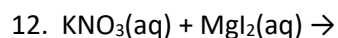
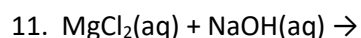
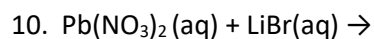
Complete and balance, then classify the following reactions:

7. Chlorine is mixed with sodium bromide

8. Sodium carbonate reacts with aluminum oxide

9. Pentane ( $C_5H_{12}$ ) goes through incomplete combustion.

Using the solubility charts provided, predict the insoluble product:



Find the amounts given, assuming STP for gases:

13. How many moles of Mg are needed to produce 1.4 L hydrogen gas when it (magnesium) is reacted with excess hydrochloric acid?

14. When .60 mol of zinc reacts with excess magnesium sulfate, how many grams of zinc sulfate are produced?

15. How many molecules of sodium are needed to completely react with 17.8 grams of water to produce sodium hydroxide?

**Limiting reagent problems**

16. How many liters of ammonia (at STP) are produced when 13.1 grams of nitrogen react with 11.5 grams of hydrogen?

17. Consider the reaction of 12.8 grams copper II sulfate with 9.75 grams calcium phosphate:

a) what is the limiting reagent?

b) how many grams of copper II phosphate are produced?

c) how many grams of excess remains?

### **% yield problems**

18. If 8.75 grams of oxygen react with excess carbon, how many grams of carbon dioxide are produced based on a yield of 75%?
19. 1.75 grams of sodium bicarbonate reacts with excess hydrochloric acid to produce .95 grams of salt. What is the percent yield of this reaction?

### **Specific heat**

20. What is the specific heat of a substance if 1490 cal is required to raise the temperature of 215 grams of a substance by 20°C?
21. How much heat is given off as 13.5 grams of pure water cools from 75.5°C to 45.5°C?
22. How much heat (in kJ) is produced if 15 grams of magnesium reacts with nitric acid? What is this value in Calories?  $\Delta H = -215\text{kJ}$

### **Gas laws**

23. 125 mL of a gas at 275.0 kPa is collected. What will the volume be if the pressure is reduced to 175.0kPa and temperature is constant?
24. 125 mL of a gas at 15°C is collected. What is the temperature of the gas if the volume expands to 315mL and the pressure is constant?
25. 125 mL of a gas at 27°C and 335 kPa is collected. What will the pressure be if it expands to 425 mL and the temperature goes down to 20°C?
26. 35.0 grams of magnesium reacts with excess hydrochloric acid at 15°C and an atmospheric pressure of 99.7 kPa. How many mL of hydrogen gas will be produced when collected over water (partial pressure of water at 15°C is 1.7 kPa).

### **VSEPR**

27. What is the name of a saturated hydrocarbon that has a chain of 8 carbon atoms?
28. What is the bond angle of silicon tetrahydride?
29. Give two possible chemical formulas for a straight chain of 3 hydrocarbons?

### **Solutions**

30. What is the molarity of a solution containing 19.2 grams of salt in 335 mL of solution?
31. How many kilograms of solvent are needed to make a 0.750 molal solution what 110 grams of barium chloride are added?

32. How many grams of magnesium sulfate are needed to make 350 cm<sup>3</sup> of a .500 M solution?

**Acids & bases**

33. What is the pOH if the  $[\text{OH}^-] = 7.5 \times 10^{-5}$ ?

34. If the  $[\text{OH}^-] = 7.75 \times 10^{-9}$ , is the solution an acid, base, or neutral?

35. What is the  $[\text{H}^+]$  if the pH = 2.75?