

## Chemistry Semester 1 Midterm 1 Review Sheet 08-09

### Answer Section

#### COMPLETION

1. ANS: chemical

DIF: 1 REF: Page 62

OBJ: 3.2.2 Define chemical change and list several indications that a chemical change has taken place.

STO: UCP.3, B.3

TOP: Define chemical change and list several indications that a chemical change has taken place.

KEY: Chemical change MSC: 1

2. ANS: physical

DIF: 1 REF: Page 61

OBJ: 3.2.1 Define physical change and list several common physical changes.

STO: UCP.3, B.2 TOP: Define physical change and list several common physical changes.

KEY: Physical change MSC: 2

3. ANS: chemical

DIF: 1 REF: Page 57

OBJ: 3.1.2 Distinguish between physical and chemical properties.

STO: B.2 TOP: Distinguish between physical and chemical properties.

KEY: Chemical property MSC: 1

4. ANS: solid

DIF: 1 REF: Page 58 OBJ: 3.1.3 Differentiate among the physical states of matter.

STO: B.2 TOP: Differentiate among the physical states of matter.

KEY: Solids MSC: 2

5. ANS: 0.0317

DIF: 2 REF: Page 318

OBJ: 11.2.3 Calculate the number of moles of an element when given the number of atoms of the element.

STO: UCP.3, B.1

TOP: Calculate the number of moles of an element when given the number of atoms of the element.

KEY: Atoms to mass conversion MSC: 3

6. ANS: 153.81

DIF: 1 REF: Page 322 OBJ: 11.3.2 Calculate the molar mass of a compound.

STO: B.3 TOP: Calculate the molar mass of a compound.

KEY: Molar mass MSC: 3



20. ANS:  
23.34
21. ANS:  
116 kg
22. ANS:  
4.26 cm
23. ANS:  
2 m<sup>3</sup>
24. ANS:  
1.90 m/s

**PROBLEM**

25. ANS:  
11 g

$$\text{mass}_{\text{bromine}} = \text{mass}_{\text{calcium bromide}} - \text{mass}_{\text{calcium}}$$

DIF: 1                      REF: Page 63

OBJ: 3.2.3 Apply the law of conservation of mass to chemical reactions.

STO: UCP.2, B.3      TOP: Apply the law of conservation of mass to chemical reactions.

KEY: Law of conservation of mass                      MSC: 3

NOT: According to the law of conservation of mass, the total mass of the reactants is equal to the mass of the product.

26. ANS:  
The percentage by mass of I = 27.7 %.  
The percentage by mass of II = 72.3 %.

DIF: 2                      REF: Page 75

OBJ: 3.4.3 Explain how all compounds obey the laws of definite and multiple proportions.

STO: UCP.2                      TOP: Explain how all compounds obey the laws of definite and multiple proportions.

KEY: Law of definite proportions                      MSC: 3

NOT: A compound is always composed of the same elements in the same proportion by mass according to the law of definite proportions.

27. ANS:  
C<sub>2</sub>H<sub>3</sub>O<sub>2</sub>

DIF: 3                      REF: Page 331, Page 332

OBJ: 11.4.2 Determine the empirical and molecular formulas for a compound from mass percent and actual mass data.                      STO: B.2

TOP: Determine the empirical and molecular formulas for a compound from mass percent and actual mass data.      KEY:                      Empirical formula      MSC: 3

28. ANS:

The empirical formula of ascorbic acid is  $C_3H_4O_3$ .The molecular formula of ascorbic acid is  $C_6H_8O_6$ .

DIF: 3 REF: Page 334

OBJ: 11.4.2 Determine the empirical and molecular formulas for a compound from mass percent and actual mass data. STO: B.2

TOP: Determine the empirical and molecular formulas for a compound from mass percent and actual mass data. KEY: Molecular formula MSC: 3

29. ANS:

$$(100 \text{ km/h}) \times (1000 \text{ m/1km}) \times (1 \text{ h}/60 \text{ min}) \times (1 \text{ min}/60 \text{ s}) = 27.8 \text{ m/s} = 30 \text{ m/s}$$

**ESSAY**

30. ANS:

The molar mass of  $AlCl_3$  is 133.33 g/mol.Multiply the molar mass by the mass of the given sample to convert the mass of  $AlCl_3$  to moles.

$$100.0 \text{ g } AlCl_3 \times \frac{1 \text{ mol } AlCl_3}{133.33 \text{ g } AlCl_3} = 0.750 \text{ mol } AlCl_3$$

Multiply by Avogadro's number to calculate the number of formula units of  $AlCl_3$ .

$$0.750 \text{ mol } AlCl_3 \times \frac{6.02 \times 10^{23} \text{ formula units}}{1 \text{ mol } AlCl_3} = 4.52 \times 10^{23} \text{ formula units } AlCl_3$$

a. To calculate the number of  $Al^{3+}$  ions, use the ratios from the chemical formula as conversion factors.

$$4.52 \times 10^{23} \text{ formula units } AlCl_3 \times \frac{1 Al^{3+} \text{ ion}}{1 \text{ formula unit } AlCl_3} = 4.52 \times 10^{23} Al^{3+} \text{ ions}$$

b. To calculate the number of  $Cl^-$  ions, use the ratios from the chemical formula as conversion factors.

$$4.52 \times 10^{23} \text{ formula units } AlCl_3 \times \frac{3 Cl^- \text{ ion}}{1 \text{ formula unit } AlCl_3} = 1.35 \times 10^{24} Cl^- \text{ ions}$$

c. The mass in grams of one formula unit of  $AlCl_3$  is:

$$\frac{133.33 \text{ g } AlCl_3}{1 \text{ mol}} \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \text{ formula unit}} = 2.21 \times 10^{-22} \text{ g } AlCl_3 / \text{ formula unit}$$

DIF: 3 REF: Page 325

OBJ: 11.3.4 Determine the number of atoms or ions in a mass of a compound.

STO: UCP.3, B.1 TOP: Determine the number of atoms or ions in a mass of a compound.

KEY: Conversion from mass to moles to particles MSC: 3