KEY

chapter 3 practice test B

1. A 0.200-g sample of a compound containing only carbon, hydrogen, and oxygen is burned, and 0.357 g of CO_2 and 0.146 g of H_2O are collected. What is the percentage of carbon in this compound?

(A) 56.0%
(B) 73.0%
(C) 48.7%
(D) 24.3%
(E) 43.2%

2. $FeCl_3$ reacts with hydrogen sulfide (H_2S) to give Fe_2S_3 and hydrogen chloride. How many moles of hydrogen sulfide are required per mole of $FeCl_3$?

A. 0.5 mol B. 1.0 mol C. 1.5 mol D. 2.0 mol E. 3.0 mol

3. A flask containing 1.00 mol of P_4O_{10} and 1.00 mol of PCl_5 was heated. The following reaction occurred. (Don't forget to balance the equation.) What is the theoretical yield of Cl_3PO?

$$P_4O_{10} + PCl_5 \longrightarrow Cl_3PO$$

A. 0.60 mol B. 1.67 mol C. 3.33 mol D. 6.00 mol E. 10.0 mol

4. Which of the following has a mass of exactly 3 grams?

A. 0.25 moles of $^{12}_{6}C$ atoms
B. 0.75 moles of He
C. 1.5 moles of H_2
D. 3 moles of H_2

not a good one skip

5. Which contains the greatest number of atoms?

A. 1 g of argon (Ar)
B. 1 g of iron (Fe)
C. 1 g of uranium (U)
D. 1 g of zinc (Zn)
E. 1 g of silver (Ag)

6. Lycopene, the red-orange pigment in tomatoes, has an empirical formula of C_5H_7 and a molecular weight of more than 450. What is the molecular formula of lycopene?

A. $C_{30}H_{42}$ B. $C_{40}H_{49}$ C. $C_{40}H_{56}$ D. $C_{42}H_{49}$ E. $C_{45}H_{70}$

7. Tungsten (W) reacts with F_2 to give a compound that is 61.73% tungsten. What is the empirical formula of this compound?

A. WF_2 B. WF_3 C. WF_4 D. WF_5 E. WF_6

8. On being burned in air, a 0.2607 g sample of caffeine yielded 0.4732 g of CO_2. Which of the following is the elemental composition of caffeine?

	C	H	N	O
A.	49.5%	5.2%	28.8%	16.5%
B.	55.5%	6.2%	24.8%	13.5%
C.	61.5%	7.2%	20.8%	10.5%
D.	67.5%	8.2%	16.8%	7.5%
E.	73.5%	9.2%	12.8%	4.5%

0.4732g CO

$$0.4732\,g\,CO_2 \times \frac{12\,g\,C}{44\,g\,CO_2} = 0.129\,g\,C$$

$$\frac{0.129\,g\,C}{0.2607} \times 100 = 49.5\%$$

1) hydrocardon + O_2 → $CO_2 + H_2O$

0.2g Burned

$$0.357g\,CO_2 \times \frac{12g\,C}{44g\,CO_2} = \frac{0.097g\,C}{0.2g} \times 100$$

$$0.146g\,H_2O \times \frac{2g\,H}{18g\,H_2O} = \frac{0.0162g\,H}{0.2g} \times 100$$

48.5 % C

8.11 % H

2) $2FeCl_3 + 3H_2S \longrightarrow Fe_2S_3 + 6HCl$

$$\frac{3mol\ H_2S}{2mol\ FeCl_3} = \frac{1.5mol\ H_2S}{1mol\ FeCl_3}$$

3) $P_4O_{10} + 6\,PCl_5 \longrightarrow 10\,Cl_3PO$

1.00 mol 1.00 mol

$1\,mol\,P_4O_{10} \times \frac{6\,mol\,PCl_5}{1\,mol\,P_4O_{10}} = 6\,mol\,PCl_5$

If I have I need

1.00 mol PCl_5 L.R.

$1.00\,mol\,PCl_5 \times \frac{10\,mol\,Cl_3PO}{6\,mol\,PCl_5} = 1.67\,mol$

Cl_3PO

theoretically

4) $0.25\,mol\,{}^{12}C \times \frac{12\,g}{1\,mol} = 3\,g\,{}^{12}C$

exactly

5) $1\,g\,Ar \times \frac{1\,mol\,Ar}{40\,g}$ = most moles

smallest denominator

6) C_5H_7 — more than 450

$$\frac{536}{67} = 8$$

$C_{40}H_{56}$

7) $61.73\,g\,W \times \frac{1\,mol}{183.84\,g} = 0.335\,mol$

$38.27\,g\,F \times \frac{1\,mol}{19\,g} = \frac{2.0\,mol}{0.335\,mol} = 6$

WF_6

8) caffeine + $O_2 \rightarrow CO_2 + H_2O$

0.2607 Burned

$0.4732\,g\,CO_2 \times \frac{12\,g\,C}{44\,g\,CO_2} = 0.129\,g\,C$

$\frac{0.129\,g\,C}{0.2607} \times 100$

49.5% C