Ch.6 AP MC review qxns – p 294 A+B

(C) 1. $27.0\text{g Al} \times \frac{1\text{mol Al}}{26.98\text{g Al}} = 1.00\text{ mol Al}$

$333\text{mL HCl} \times \frac{3.0\text{ mol}}{1000\text{mL}} = 0.999\text{ mol} = 1.0\text{ mol HCl}$ (limiting) $\times \frac{3\text{ mol H}_2}{6\text{ mol HCl}} = 0.50\text{ mol H}_2$

@ STP 1 mol gas = 22.4 l $\quad 0.50\text{ mol H}_2 \times \frac{22.4\text{ l}}{\text{mol}} = \boxed{11.2\text{ l H}_2}$

(A) 2. $D = \frac{m}{V} = \frac{\left(.50\text{mol H}_2 \times \frac{2\text{g H}_2}{1\text{mol H}_2}\right)}{11.2\text{ l}} = \frac{1\text{g}}{11.2\text{ l}} = 0.0899/\text{l} = \boxed{0.1\text{ g/L}}$

(B) 3. $\Delta H°_{rxn} = 8(\Delta H°_f\ CO_2) + 10(\Delta H°_f\ H_2O) - 2(\Delta H°_f\ C_4H_{10})$

$= 8(-393.5) + 10(-285.8) - 2(-124.7)$

$= \boxed{-5756.6\text{ kJ}}$

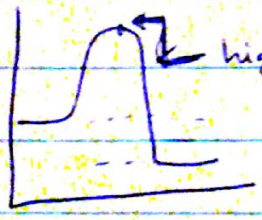
(B) 4. $2CH_3OH + 3O_2 \rightarrow 2CO_2 + 4H_2O$

$\Delta H_{rxn} = 2(CO_2) + 4(H_2O) - 2(CH_3OH)$

$= 2(-393.5) + 4(-285.8) - 2(-201.0)$

$= \boxed{-1528.2\text{ kJ}}$

(C) 5.



(D) 6. $q_{melting} = \text{mass}_{ice} \times \Delta H_{fusion}$

$= 250\text{g} \times \frac{1\text{kg}}{1000\text{g}} \times \frac{332\text{ kJ}}{\text{kg}} = 83\text{ kJ}$

$q_{warming} = mc\Delta T$

$= (250\text{g})\left(\frac{4.18\text{ J}}{\text{g}}\right)(25.0°\text{C})$

$= 26{,}125\text{ J} = 26.125\text{ kJ}$

$q_{total} = 83 + 26.125 = \boxed{109.125\text{ kJ}}$

(B) 7. $-q_{metal} = +q_{kerosene}$

$-(mc\Delta T)_{metal} = (mc\Delta T)_{kerosene}$

$-(20.g)(c)(60°C - 110°C) = (30.g)(2.0\ J/g°C)(60°C - 35°C)$

$1000c = 1500$

$c = \boxed{1.5\ J/g°C}$

(D) 8. Use Hess's Law

$3C + 3O_2 \rightarrow 3CO_2$	$3W$
$2Al + 3/2\ O_2 \rightarrow Al_2O_3$	$\frac{1}{2}X$
$Al_2(CO_3)_3 \rightarrow 2Al + 3/2\ O_2 + 3C$	$-Y$
$Al_2(CO_3)_3 \rightarrow Al_2O_3 + 3CO_2$	$3W + 1/2\ X - Y$

(D) 9. $W = -P\Delta V$

(A) $(-\frac{1}{2}\ atm)(5L - 1L) = -2\ atm \cdot L$

(B) $-(1\ atm)(5L - 1L) = -4\ atm \cdot L$

(C) $-(3\ atm)(5L - 1L) = -12\ atm \cdot L$

(D) $-(2\ atm)(10L - 1L) = -18\ atm \cdot L$

(D) 10. ~~The metals lose heat to the water~~ $q_{metal} = -q_{H_2O}$ $q = cm\Delta T$

The metal with the smallest heat capacity will lose the most heat to the water; therefore the final temperature will be the lowest.

(B) 11. Neutralization rxns are exothermic ∴ ΔH_{calc} has a negative sign, but it is less negative than the actual value because some of the heat has escaped.

12. (C) Melting requires energy, ∴ it is an endothermic process.

13. (C) $2CO_2 + H_2O \rightarrow C_2H_2 + 5/2\ O_2$ $\quad \Delta H = (+2600.0\ kJ) \times -\frac{1}{2}$

$2\ C_{(graphite)} + 2O_2 \rightarrow 2CO_2$ $\quad \Delta H = (-394\ kJ) \times 2$

$H_2 + O_2 \rightarrow H_2O$ $\quad \Delta H = (-574\ kJ) \times -\frac{1}{2}$

$2\ C_{(graphite)} + H_2 \rightarrow C_2H_2$ $\quad \Delta H = 225\ kJ$

14. (A) $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$ $\quad \Delta H^\circ = W\ kJ$

$C_2H_5OH \rightarrow C_2H_4 + H_2O$ $\quad \Delta H^\circ = (Y\ kJ) \times -1$

$C_2H_5OH + 3O_2 \rightarrow 3H_2O + 2CO_2$ $\quad \Delta H^\circ = W - Y$

15. (A) $2\ Na + 2\ H_2O \rightarrow 2\ NaOH + H_2$

$\Delta H_{rxn} = 2\Delta H_f^\circ\ (NaOH) - 2\Delta H_f^\circ (H_2O)$

$= 2(-470) - 2(-286)$

$= \boxed{-368\ kJ}$