#32 1.245 g mixture
− .832 g $CuSO_4$
.413 g H_2O

$$CuSO_4 \cdot 5H_2O \xrightarrow{\Delta} CuSO_4 + 5\ H_2O$$
249.72 159.62 18.02

G: .413 g H_2O
D: ? g $CuSO_4 \cdot 5H_2O$

$$.413\text{g } H_2O \times \frac{1\text{mol } H_2O}{18.02\text{g } H_2O} \times \frac{1\text{mol } CuSO_4 \cdot 5H_2O}{5\text{mol } H_2O} \times \frac{249.72\text{g}}{1\text{mol } CuSO_4 \cdot 5H_2O}$$

$$= 1.145\text{ g } CuSO_4 \cdot 5H_2O$$

$$\frac{1.145\text{g hydrate}}{1.245\text{g mixture}} \times 100 = \boxed{91.9\%\text{ HYDRATE}}$$

#34 G: .951 g C_6H_6
D: ? g $Al(C_6H_5)_3$

$$.951\text{g } C_6H_6 \times \frac{1\text{mol } C_6H_6}{78.12\text{g } C_6H_6} \times \frac{1\text{mol } Al(C_6H_5)_3}{3\text{mol } C_6H_6} \times \frac{258.3\text{g } Al(C_6H_5)_3}{1\text{mol } Al(C_6H_5)_3}$$

$$= 1.048\text{ g } Al(C_6H_5)_3$$

$$\frac{1.048\text{ g}}{1.25\text{g mix}} \times 100 = \boxed{83.8\%}$$

#36 $1.481\,g\,CO_2 \times \frac{1\,mol\,CO_2}{44.0\,g\,CO_2} \times \frac{1\,mol\,C}{1\,mol\,CO_2} = .03365\,mol\,C$

$.303\,g\,H_2O \times \frac{1\,mol\,H_2O}{18.02\,g\,H_2O} \times \frac{2\,mol\,H}{1\,mol\,H_2O} = .03363\,mol\,H$

Empirical formula = $\boxed{CH}$

#38 $.269\,g\,CO_2 \times \frac{1\,mol\,CO_2}{44.0\,g\,CO_2} \times \frac{1\,mol\,C}{1\,mol\,CO_2} \times \frac{12.0\,g\,C}{1\,mol\,C} = .0734\,g\,C$

$.110\,g\,H_2O \times \frac{1\,mol\,H_2O}{18.02\,g\,H_2O} \times \frac{2\,mol\,H}{1\,mol\,H_2O} \times \frac{1.0\,g\,H}{1\,mol\,H} = .0123\,g\,H$

$.0956\,g\,menthol - .0734\,g\,C - .0123\,g\,H = .0099\,g\,O$

C	H	O
$.0734\,g \times \frac{1\,mol\,C}{12.0\,g}$	$.0123\,g \times \frac{1\,mol\,H}{1.0\,g}$	$.0099\,g \times \frac{1\,mol\,O}{16.00\,g\,O}$
$= \frac{.006111157}{.00061825}$	$= \frac{.012178\,mol}{.00061825}$	$= \frac{.00061875\,mol}{.00061825}$
9.87	19.68	: 1
10	20	1

$\boxed{C_{10}H_{20}O}$

Si 28.09
O_2 32.00

#40

$$11.64\text{ g } SiO_2 \times \frac{1\text{ mol } SiO_2}{60.09\text{ g } SiO_2} \times \frac{1\text{ mol Si}}{1\text{ mol } SiO_2} = .1937\text{ mol Si}$$

$$6.980\text{ g } H_2O \times \frac{1\text{ mol } H_2O}{18.02\text{ g } H_2O} \times \frac{2\text{ mol H}}{1\text{ mol } H_2O} = .7746\text{ mol}$$

Si	H
$\frac{.1937\text{ mol}}{.1937}$	$\frac{.7746\text{ mol}}{.1937}$
1 :	3.999

Empirical Formula = SiH_4

AP Question

$$.138\text{ g } CO_2 \times \frac{1\text{ mol } CO_2}{44.0\text{ g } CO_2} \times \frac{1\text{ mol C}}{1\text{ mol } CO_2} \times \frac{12.0\text{ g C}}{1\text{ mol C}} = \frac{.03766\text{ g C}}{.150\text{ g}} = 25.1\%\text{ C}$$

$$.0566\text{ g } H_2O \times \frac{1\text{ mol } H_2O}{18.02\text{ g}} \times \frac{2\text{ mol H}}{1\text{ mol } H_2O} \times \frac{1.0\text{ g H}}{1\text{ mol H}} = \frac{.006345\text{ g H}}{.150\text{ g}} = 4.23\%\text{ H}$$

$$.0238\text{ g } NH_3 \times \frac{1\text{ mol } NH_3}{17.04\text{ g } NH_3} \times \frac{1\text{ mol N}}{1\text{ mol } NH_3} \times \frac{14.0\text{ g N}}{1\text{ mol N}} = \frac{.019568\text{ g N}}{.200\text{ g}} = 9.78\%\text{ N}$$

$$.251\text{ g AgCl} \times \frac{1\text{ mol AgCl}}{143.5\text{ g}} \times \frac{1\text{ mol Cl}}{1\text{ mol AgCl}} \times \frac{35.45\text{ g Cl}}{1\text{ mol Cl}} = \frac{.06208\text{ g Cl}}{.125\text{ g}} = 49.66\%\text{ Cl}$$

$100\% - 25.1\%\text{ C} - 4.23\%\text{ H} - 9.78\%\text{ N} - 49.66\%\text{ Cl} = 11.23\%\text{ O}$

AP Qsn (continued)
assume 100 g sample

C $25.1\,g \times \frac{1\,mol\,C}{12.0\,g} = 2.0899\,mol\,C / .698 \approx 3$

H $4.23\,g\,H \times \frac{1\,mol}{1.0\,g} = 4.188\,mol\,H / .698 \approx 6$

N $9.78\,g\,N \times \frac{1\,mol\,N}{14.0\,g} = .6981\,mol\,N / .698 \approx 1$

Cl $49.66\,g\,Cl \times \frac{1\,mol\,Cl}{35.45\,g} = 1.401\,mol\,Cl / .698 \approx 2$

O $11.23\,g\,O \times \frac{1\,mol\,O}{16.00\,g} = .7019\,mol\,O / .698 \approx 1$

$C_3H_6NCl_2O$

whew!