1. $65.4\ g\ N_2 \times \frac{1\ mol\ N_2}{28\ g\ N_2} \times \frac{2\ mol\ NH_3}{1\ mol\ N_2} \times \frac{17\ g\ NH_3}{1\ mol\ NH_3} = 79.4\ g\ NH_3$

$98.7\ g\ H_2 \times \frac{1\ mol}{2\ g} \times \frac{2\ mol\ NH_3}{3\ mol\ H_2} \times \frac{17\ g\ NH_3}{1\ mol\ NH_3} = 559.3\ g\ NH_3$

$N_2 + 3H_2 \rightarrow 2NH_3$

Answer - less amount of $NH_3$

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NO #2

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3. $M = \frac{mol}{L}$ $\frac{4.0\ mol}{1.5\ L}$ = this would give M - but is not asked for in the problem

A. Solute is $Ca_3(PO_4)_2$

B. $4.0\ mol \times \frac{310.3\ g}{1\ mol} = 1241.2\ g$

$Ca = (40.1)3 = 120.3$
$P = (31)2 = 42 +$
$O = (16)8 = 128$
$310.3$

4. Acid ($HCl$) Base ($Ca(OH)_2$)

$M = \frac{mol}{L}$ $M = \frac{mol}{L}$

$.15 = \frac{mol}{.050}$ $M = \frac{mol}{.023} = \frac{.00375}{.023}$

$.0075 = mol\ HCl \left| \frac{1\ mol\ Ca(OH)_2}{2\ mol\ HCl} \right. = .00375\ mol\ Ca(OH)_2$ → $M = .16$

↳ Write a balanced equation

$2HCl + Ca(OH)_2 \rightarrow 2H_2O + CaCl_2$

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5. $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

From organic – methane – single bond

1 carbon

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6. $Na^+$ $1s^2 2s^2 2p^6$

lost an $e^-$

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7. $Cl^-$ $1s^2 2s^2 2p^6 3s^2 3p^6$

gained an electron

---

8. Recall for STP : 22.4L = 1 mol

$6.28\ g\ Fe \left| \frac{1\ mol\ Fe}{55.9\ Fe} \right| \frac{4\ mol\ H_2}{3\ mol\ Fe} \left| \frac{22.4\ L}{1\ mol} \right. = 9.35\ L\ H_2$

NO #9

NO #10

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11. % yield = $\frac{\text{actual}}{\text{theor.}}$

$$= \frac{.0349 \text{ mol C}}{.0502 \text{ mol C}} \times 100 = \boxed{69.5\%}$$

$$.0251 \text{ mol A} \left| \frac{4 \text{ mol C}}{2 \text{ mol A}} \right. = .0502 \text{ mol C theor.}$$

---

12. $Ag_2S \longrightarrow 2Ag + S$

$$.025 \text{ mol } Ag_2S \left| \frac{2 \text{ mol Ag}}{1 \text{ mol } Ag_2S} \right| \frac{107.8 \text{ g Ag}}{1 \text{ mol}} = \boxed{5.39 \text{ g Ag}}$$

---

13. All are [OH⁻] amounts:

A. $1 \times 10^{-5} = [OH^-]$ so $[H^+] = 1 \times 10^{-9}$ so pH = 9
OR pOH = 5 so pH = 9

B. $5 \times 10^{-8} = [OH^-]$ so pOH = 7.30 so pH = 6.7

C. $2.90 \times 10^{-11} = [OH^-]$ so pOH = 10.53 so pH = 3.47

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NO #14

NO #15

16.

$$2C + 2H_2O \longrightarrow CH_4 + CO_2$$

overall equation

Given:

$C + H_2O \longrightarrow CO + H_2$ 131.3

$CO + H_2O \longrightarrow CO_2 + H_2$ -41.2

$CH_4 + H_2O \longrightarrow 3H_2 + CO$ 206.1

WORK SHOWN BELOW

Rewrite $2(2C + 2H_2O \longrightarrow 2CO + 2H_2)$ $2(131.3) = 262.6$

Flip $3H_2 + CO \longrightarrow CH_4 + H_2O$ -206.1

$CO + H_2O \longrightarrow CO_2 + H_2$ -41.2

Rewrite $2C + 2H_2O \longrightarrow CH_4 + CO_2$

$\Delta H = 15.3$ KJ

NO 17

18. A

B.

19.

A. 2-methyl-2-pentene

B. 1,3-dimethyl benzene