

밀도 문제 풀이 (1-5)

$$\frac{251}{249} \Rightarrow \left(\frac{1.004}{1.006} \right)$$

예(1) $\rho = \frac{m}{V}$, $m = \rho V = (21.5 \text{ g/cm}^3) (4.49 \text{ cm}^3)$
 $= \underline{96.5 \text{ g}}$

예(2) $m, V \rightarrow \rho = \frac{m}{V} = \frac{30 \text{ g}}{15.6 \text{ cm}^3} = \underline{19.3 \text{ g/cm}^3}$

예(3) $\rho, V \rightarrow m$

$\rho = \frac{m}{V}$, $m = \rho V = (13.6 \text{ g/mL}) (5.50 \text{ mL})$
 $= \underline{74.8 \text{ g}}$

1-6 (온도)

a) $(^{\circ}\text{C} \rightarrow ^{\circ}\text{F}) \Rightarrow \frac{9}{5}(^{\circ}\text{C}) + 32$

$\left[\left(\frac{9}{5} \right)^{=1.8} (224^{\circ}\text{C}) + 32 = \underline{435.2^{\circ}\text{F}}$

b) $(^{\circ}\text{F} \rightarrow ^{\circ}\text{C}) \Rightarrow ^{\circ}\text{F} = \frac{9}{5}^{\circ}\text{C} + 32$
 $\left[^{\circ}\text{F} - 32 = \frac{9}{5}^{\circ}\text{C} \right]$

$$^{\circ}\text{C} = \frac{5}{9} (^{\circ}\text{F} - 32)$$

$$= \frac{5}{9} (-452^{\circ}\text{F} - 32) = \underline{\underline{-269^{\circ}\text{C}}}$$

c) $^{\circ}\text{C} \xrightarrow{+273.15} \text{K}$

$$-38.9^{\circ}\text{C} + 273.15 = \underline{\underline{234.1\text{K}}}$$

☆ 유효숫자의 사칙연산

① 곱셈 / 나눗셈 \rightarrow 소숫점의 자리수 \downarrow

② 덧셈 / 뺄셈 \rightarrow 유효숫자의 개수 \downarrow

a) $\underbrace{11254.1}_{\text{첫번째}} + \underbrace{0.1983}_{\text{네번째}} = \text{첫번째}$

$$\begin{array}{r} 11254.1 \\ + 0.1983 \\ \hline 11254.2983 \Rightarrow \boxed{11254.3} \end{array}$$

b) $\frac{66.59L}{2} - \frac{3.113L}{3} \Rightarrow 2$

$$\begin{array}{r} 66.59^8 \\ - 3.113^{10} \\ \hline 63.477 \Rightarrow 63.48L \end{array}$$

c) $\frac{8.16m}{3\text{개}} \times \frac{5.1355}{5\text{개}} = 41.8XXX \Rightarrow 41.9$
 $\Rightarrow \frac{3\text{개}}{3\text{개}}$

d) $\frac{0.0154}{3\text{개}} \div \frac{88.3}{3\text{개}} = \frac{0.000174}{3\text{개}} \times X$
 $\Rightarrow 0.000174$

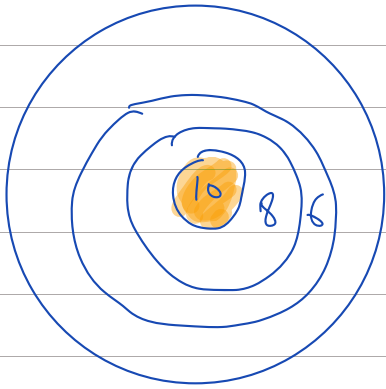
e) $\square \times 10^{\text{㉞}} = \text{큰수}$

$(2.64 \times 10^{\text{㉓}}) + (3.21 \times 10^{\text{㉒}})$

⇓

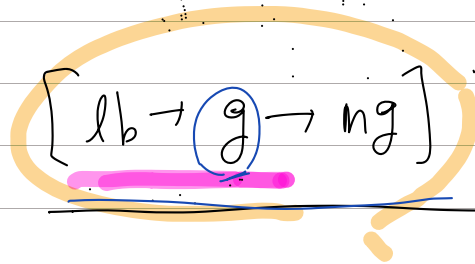
$(2.64 + 0.321) \times 10^{\text{㉓}}$
 $\downarrow \quad \downarrow \quad \Rightarrow \underline{2}$
 $\text{㉒} \quad \text{㉓}$

$\left(\begin{array}{r} 2.64 \\ + 0.321 \\ \hline 2.961 \end{array} \right) \Rightarrow \underline{2.97 \times 10^{\text{㉓}}}$



1-9 (관위 하위분석)

1. $1 \text{ lb} = 453.6 \text{ g}$
 $1 \text{ g} = 1000 \text{ mg}$



$$0.0833 \cancel{\text{ lb}} \times \frac{453.6 \cancel{\text{ g}}}{1 \cancel{\text{ lb}}} \times \frac{1000 \cancel{\text{ mg}}}{1 \cancel{\text{ g}}}$$

$$= 3.78 \times 10^4 \text{ mg}$$

2. $\text{L} \rightarrow \text{m}^3$ ($1 \text{ m}^3 = 1000 \text{ L} = 10^6 \text{ cm}^3 (= \text{m}^3)$)

$$5.2 \cancel{\text{ L}} \times \frac{1 \cancel{\text{ m}^3}}{1000 \cancel{\text{ L}}} = 5.2 \times 10^{-3} \text{ m}^3$$

예(3)

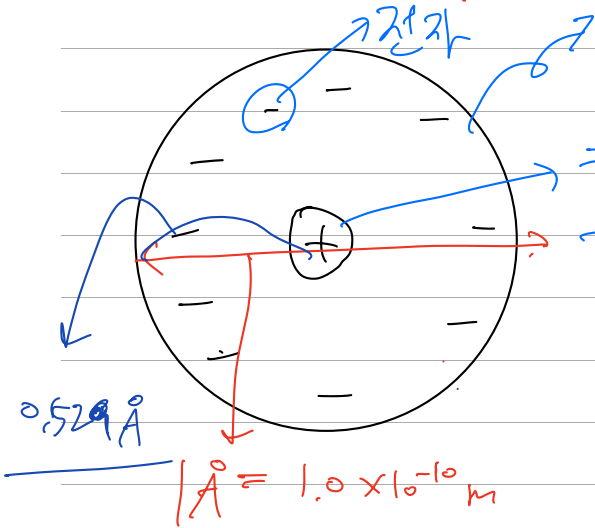
$$0.808 \text{ g/cm}^3 \rightarrow \square \text{ kg/m}^3$$

- ① $\text{g} \rightarrow \text{kg}$ $1 \text{ kg} = 1000 \text{ g}$
- ② $\text{cm}^3 \rightarrow \text{m}^3$ $1 \text{ m}^3 = 10^6 \text{ cm}^3$

$$\frac{0.808 \cancel{\text{g}}}{1 \cancel{\text{cm}^3}} \times \frac{1 \cancel{\text{kg}}}{1000 \cancel{\text{g}}} \times \frac{10^6 \cancel{\text{cm}^3}}{1 \cancel{\text{m}^3}} = 808 \text{ kg/m}^3$$

* 원자

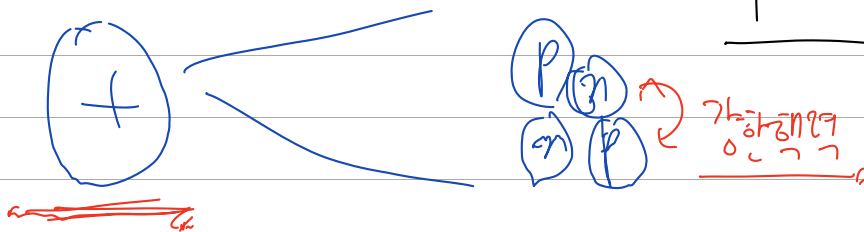
전하량 : $-1.6 \times 10^{-19} \text{ C/개}$
 질량 : $9.1 \times 10^{-31} \text{ kg/개}$

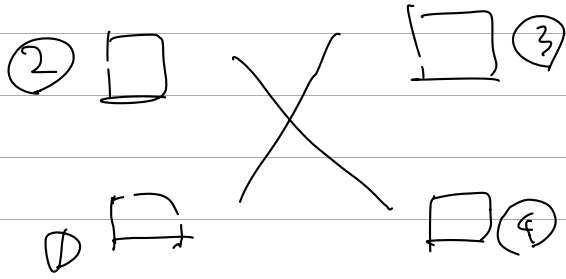


양성자 전하량 : $+1.6 \times 10^{-19} \text{ C/개}$
 질량 : $1.67 \times 10^{-27} \text{ kg/개}$
 중성자 전하량 = 0
 질량 : $1.68 \times 10^{-27} \text{ kg/개}$

대부분 | : | 2:1 (양성자 : 중성자)

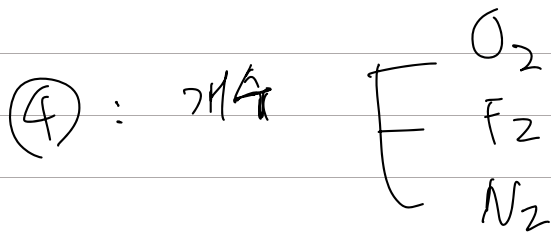
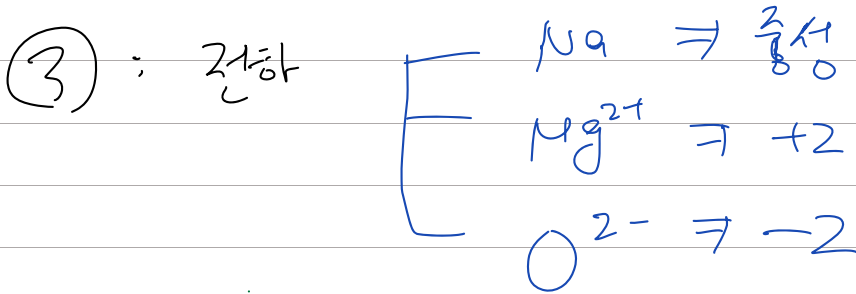
$$p : n = 1 : 1.5$$





중성원자의 전자수

- ① : 원자번호 (=양성자수)
- ② : 질량수 (=양성자 + 중성자)



23 = 양성자 \times 11
 11 = 양성자
 전자수 = 11개
 양성자 = 12

20 \times 2- 27 \times 3+

⑩ 13

양 = 10 양 = 13

중 = 10 중 = 14

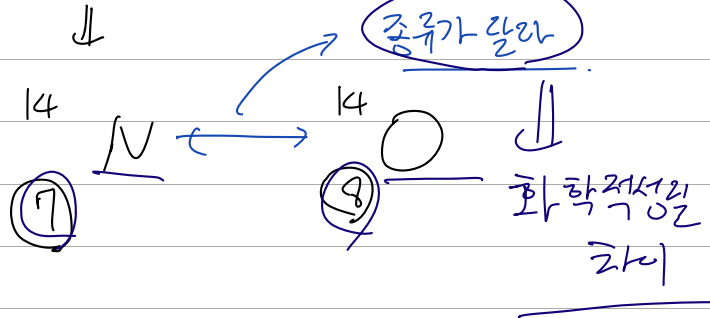
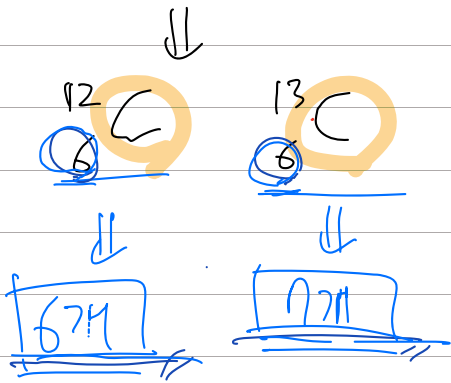
전 = 12 전 = 10

동위 원소

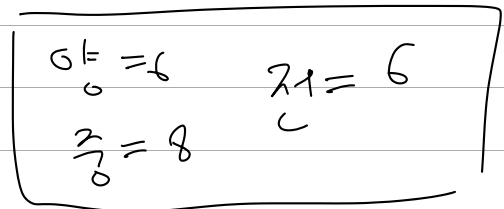
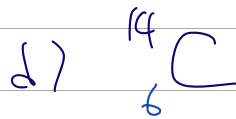
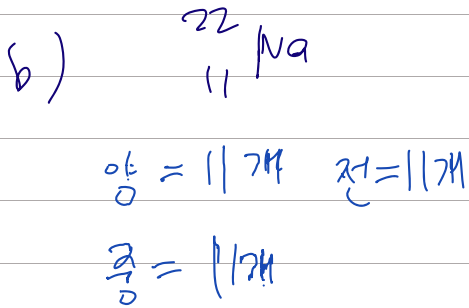
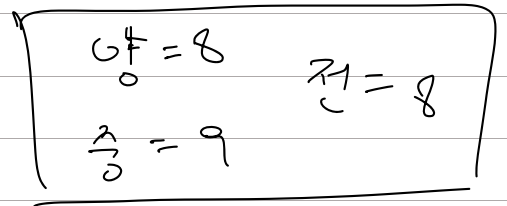
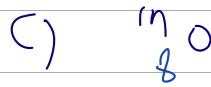
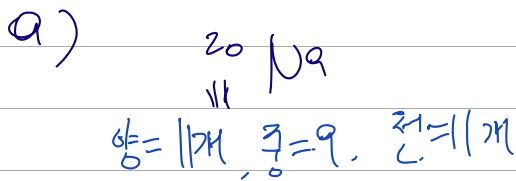
VS

중성 원소

예



예제)



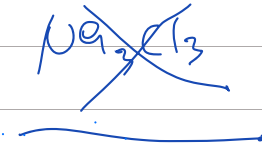
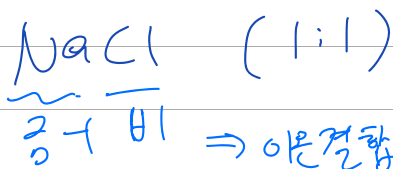
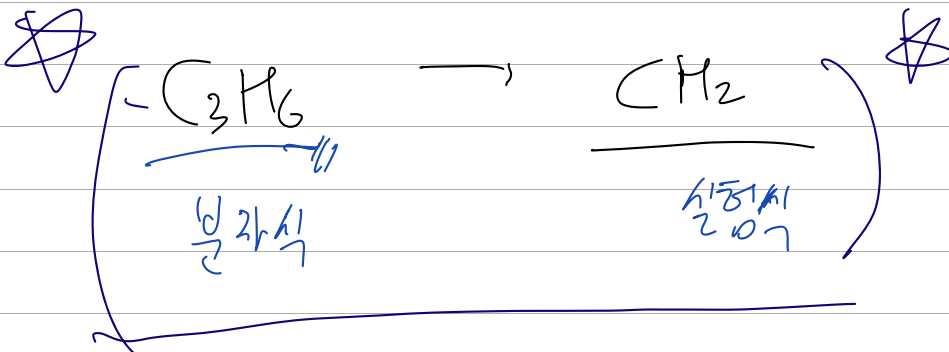
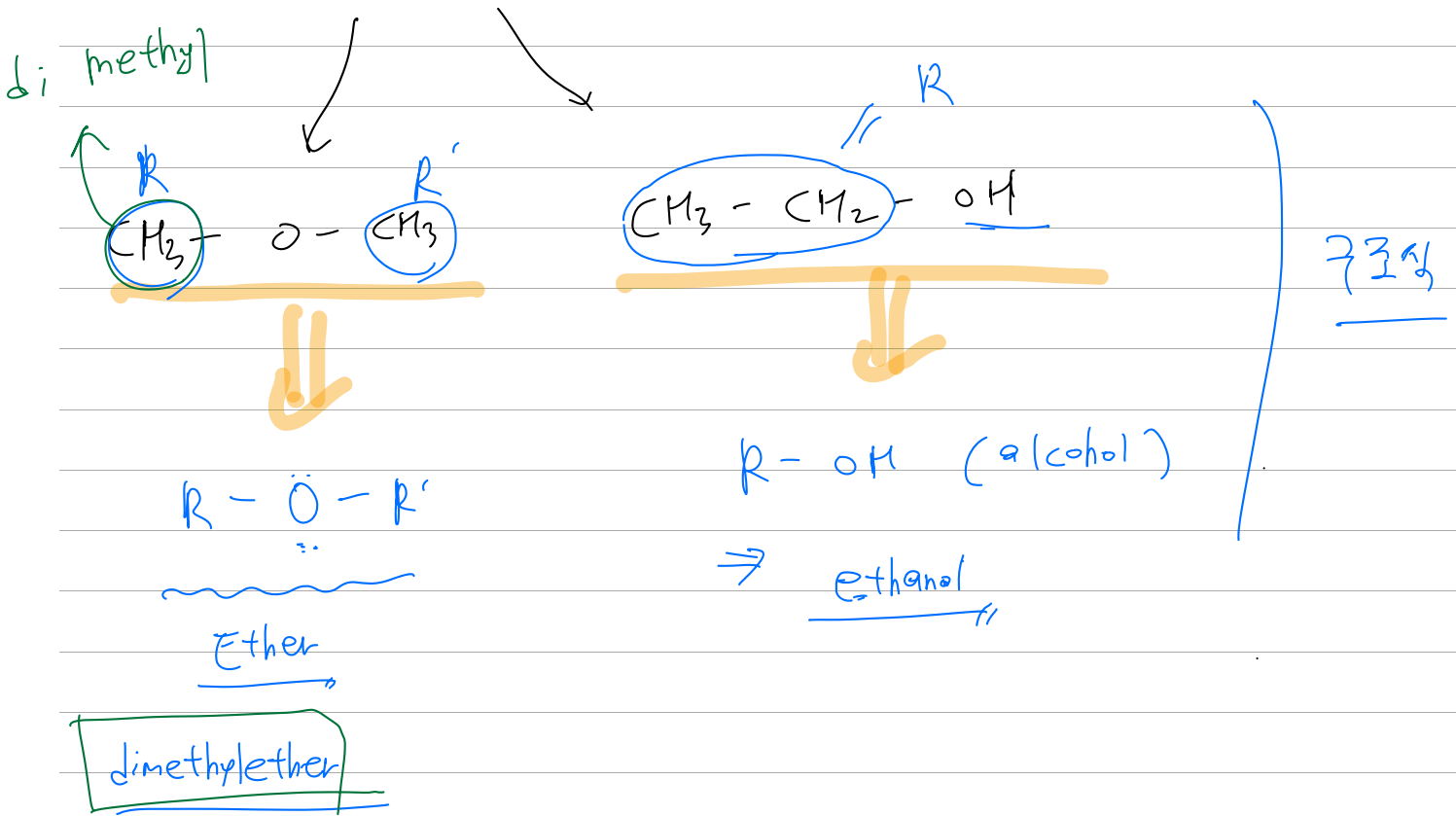
a & b ⇒ 중성 원소

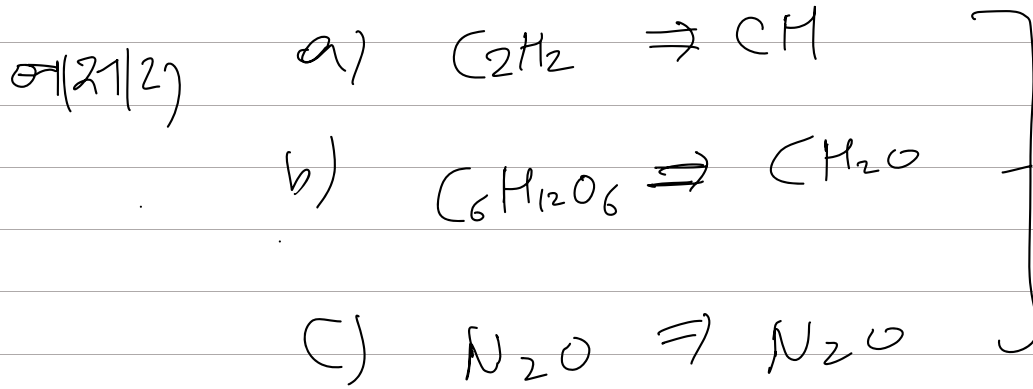
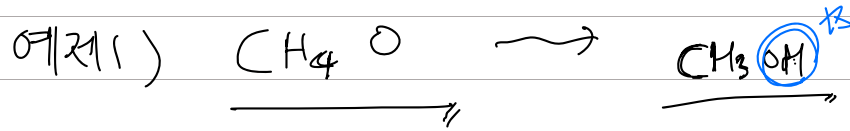


[~ 26번 (주기율표)]

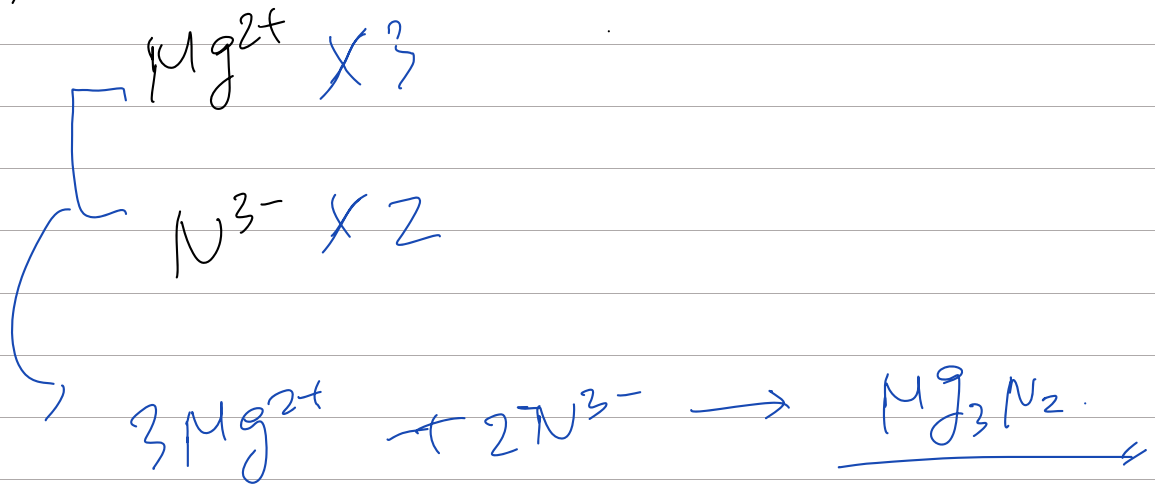


ex) $C_2H_6O \rightarrow$ 분자식



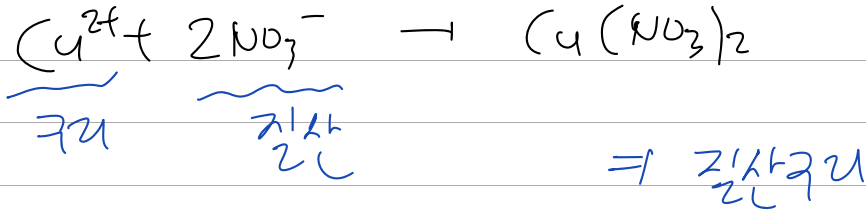
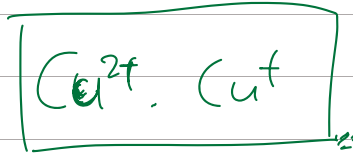


예(21(3))



~~수화물~~ p.19

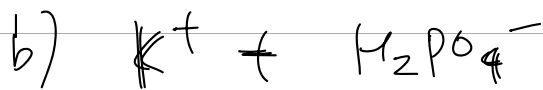
예제 1)



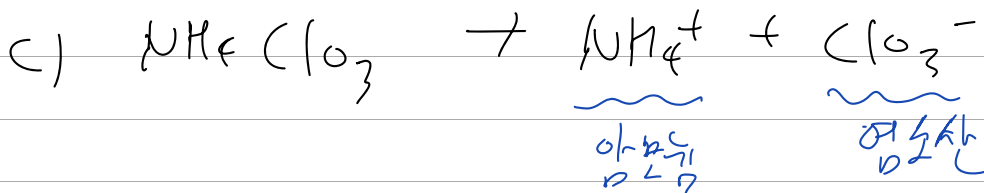
↓

질산 제이구리

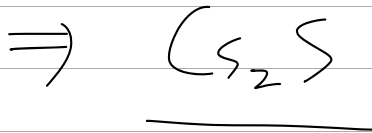
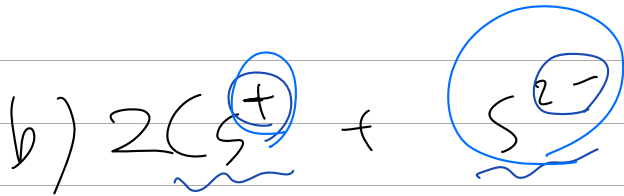
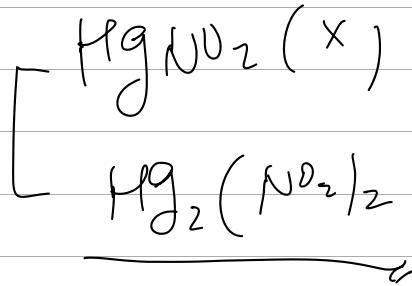
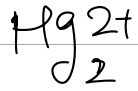
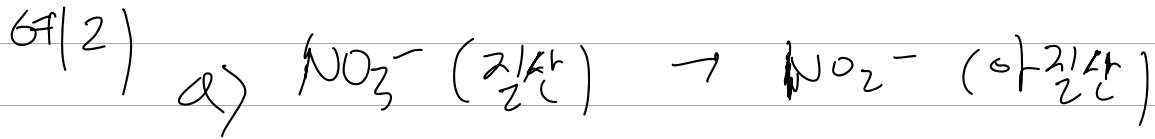
Copper(II) nitrate



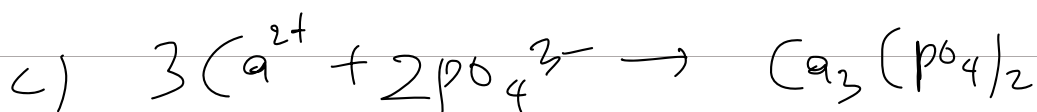
이산 이산 포스페이트



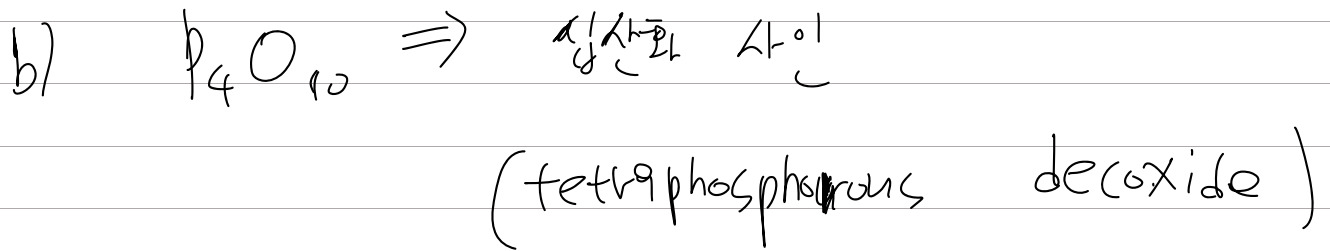
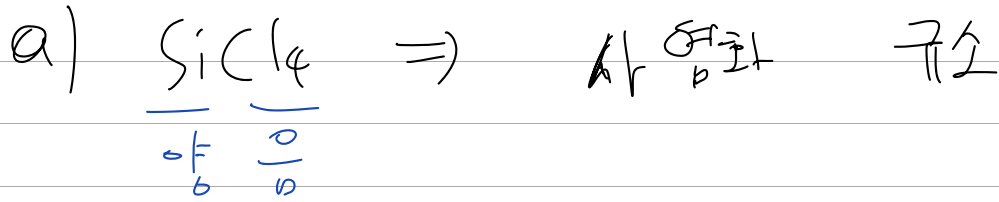
\Rightarrow 아질산 아모늄



- ~~1족~~ 1족 = +1, 2족 = +2, 3족, +3
- N, P, ... (15족) : -3
- O, S, Se, Te ... (16족) : -2
- F, Cl, Br, I ... (17족) : -1



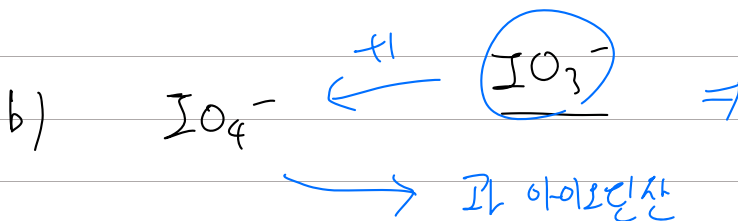
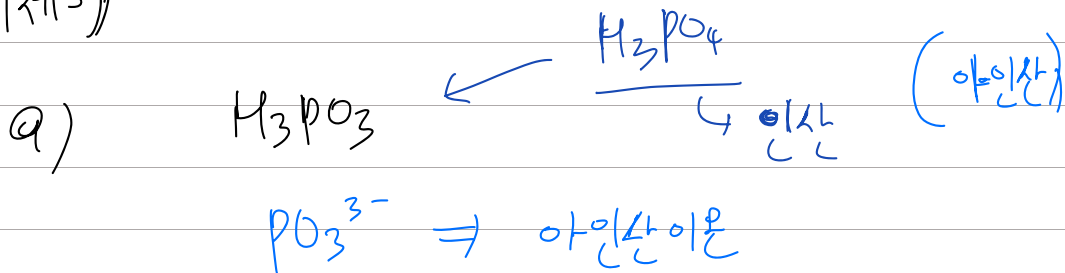
예제 3)



예제 4)



예제 5)



★ $^{12}\text{C} = 12 \text{amu}$ atomic mass unit

6.02×10^{23} 개

12g

① ^1H ($1 \text{amu} \times 0.08$)
 $(^{12}\text{C} \text{의 } 8\%) = 1.009 \text{g}$

$(^1\text{H} \doteq 1 \text{amu})$

^{16}O ($16 \text{amu} \times 1.33$)
 $= 15.994 \text{g}$

$= 16 \text{g}$

$(^{16}\text{O} \doteq 16 \text{amu})$

$N_A = 6.02 \times 10^{23}$ 개
 $^{12}\text{C} = 12 \text{amu}$
 $12 \text{C } 1 \text{개 당}$
 1mol

$^{12}\text{C} = 12 \text{g}$
 $= 12 \text{C } 1 \text{몰의 질량}$

$^1\text{H} = 1 \text{amu}$ $\xrightarrow{6.02 \times 10^{23} \text{ 개}}$

$^1\text{H} = 1 \text{g}$
 $1 \text{H } 1 \text{몰의 질량}$

$^{16}\text{O} = 16 \text{amu}$ $\xrightarrow{6.02 \times 10^{23} \text{ 개}}$

$^{16}\text{O} = 16 \text{g}$
 $^{16}\text{O } 1 \text{몰의 질량}$

$1 \text{mol} = 6.02 \times 10^{23} \text{ 개}$

N ⇒ 14g/mol $\xrightarrow{2\text{mol}}$ 28g

S $\xrightarrow{10\text{mol}}$ 321g

(32.1g/mol)

Cl $\xrightarrow{0.5\text{mol}}$ 17.25g

171 = 35.5g/mol

C: 12g/mol

H: 1g/mol

O: 16g/mol
15.994

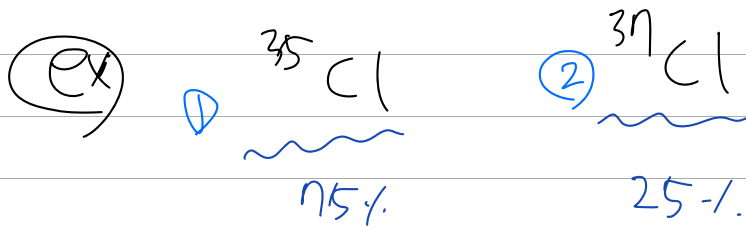
N: 14g/mol

Cl: 35.5g/mol

S: 32.1g/mol

Na: 23g/mol

Mg: 24.3g/mol



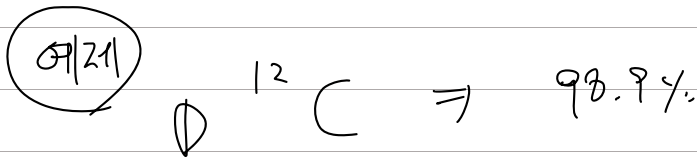
↓

$$\sum (\text{원자량}) \times (\text{특정원자량 존재비율})$$

$$\Rightarrow \{ 35 \times (0.75) \} + \{ 37 \times (0.25) \}$$

$$= \boxed{35.5 \text{ g/mol}}$$

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$$\Rightarrow (12 \times 0.989) + (13 \times 0.011) = \underline{12.01 \text{ g/mol}}$$



$$\left[g \longleftrightarrow \text{mol} \longleftrightarrow \text{개} \right]$$

$$\text{lb} \leftrightarrow g \leftrightarrow \text{mg}$$

예제 1)

$$\left[\begin{array}{l} 1.00 \text{ carat} = 0.200 \text{ g} \\ 1 \text{ mol} = 6.02 \times 10^{23} \text{ 개} \\ 1 \text{ mol C} = 12 \text{ g} \end{array} \right]$$

$$\text{carat} \rightarrow g \rightarrow \text{mol} \rightarrow \text{개}$$

$$1.00 \text{ carat} \times \frac{0.200 \text{ g}}{1 \text{ carat}} \times \frac{1 \text{ mol C}}{12 \text{ g}} \times \frac{6.02 \times 10^{23} \text{ 개}}{1 \text{ mol}}$$

$$= 1.0 \times 10^{22} \text{ 개}$$

예제 2) $[g \leftrightarrow mol \leftrightarrow g]$

① $5.0 \times 10^{21} \cancel{g} \times \frac{1 \text{ mol}}{6.02 \times 10^{23} \cancel{g}} = 8.3 \times 10^{-3} \text{ mol}$

② $8.3 \times 10^{-3} \cancel{\text{ mol}} \times \frac{12 \text{ g}}{1 \cancel{\text{ mol}}} = 6.1 \text{ g}$

예제 3)

$\frac{238 \text{ U}}{1 \text{ mol}} = \frac{12 \text{ g}}{1 \text{ mol}} = 12 \text{ g/mol}$

$1 \text{ mol} = 238.0508 \text{ g}$

$\frac{238.0508 \text{ g}}{6.02 \times 10^{23} \cancel{\text{ mol}}} = 3.95 \times 10^{-22} \text{ g/mol}$

ex) $N_2H_4 \Rightarrow (14 \times 2) \text{ g} + (1 \times 4) \text{ g}$
 $= 32 \text{ g/mol}$

$$\text{NaCl} \Rightarrow (23\text{g/mol}) + (35.5\text{g/mol})$$

$$= \underline{58.5\text{g/mol}}$$

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예제1)

$$[\text{g} \leftrightarrow \text{mol} \leftrightarrow \text{개}]$$

$$\textcircled{1} \text{ g} \leftrightarrow \text{mol} \Rightarrow (14 \times 1 + 16 \times 2) = \underline{46\text{g/mol}}$$

$$\hookrightarrow \underline{\text{mol} = 46\text{g}}$$

$$\textcircled{2} \text{ mol} \leftrightarrow \text{개} \Rightarrow \underline{\text{mol} = 6.02 \times 10^{23} \text{개}}$$

$$\textcircled{1} \quad 4.000\text{g} \times \frac{\text{mol}}{46\text{g}} = \underline{0.08695\text{mol}}$$

$$\textcircled{2} \quad 0.08695\text{mol} \times \frac{6.02 \times 10^{23} \text{개}}{\text{mol}}$$

$$= \underline{5.236 \times 10^{22} \text{개}}$$

예(제12) [g ↔ mol ↔ g]

a) $C_2H_3O_2Cl_3$ $\xrightarrow{35.5}$

$$\hookrightarrow (12 \times 2) + (1 \times 3) + (16 \times 2) + (35.5 \times 3)$$

$$= \underline{165.5 \text{ g C.M}}$$

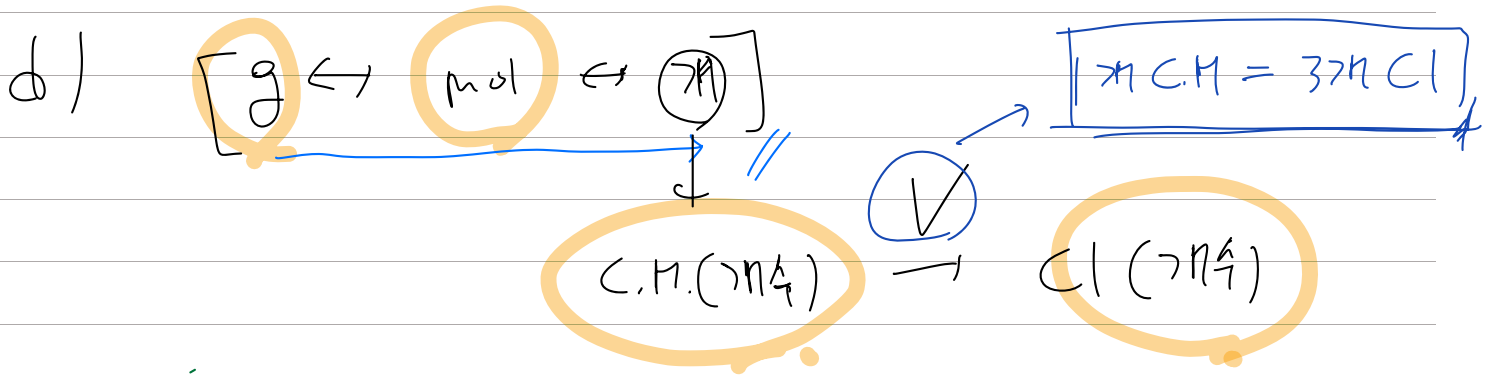
b) [g → mol] (mol = 165.5g)

$$\Rightarrow 500 \cancel{\text{g}} \text{ C.M} \times \frac{1 \text{ mol C.M}}{165.5 \cancel{\text{g}} \text{ C.M}} = \underline{3.023 \text{ mol}}$$

c) [mol → g]

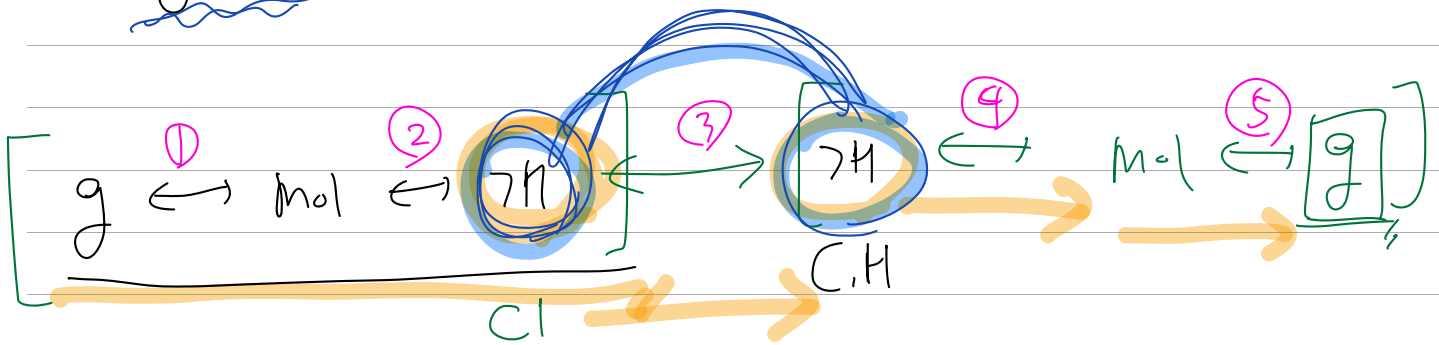
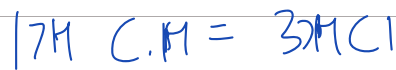
$$2.0 \times 10^{-2} \cancel{\text{mol}} \text{ C.M} \times \frac{165.5 \text{ g C.M}}{1 \cancel{\text{mol}} \text{ C.M}}$$

$$= \underline{3.3 \text{ g}}$$



$$5\text{g C.H} \times \frac{1\text{mol C.H}}{165.5\text{g C.H}} \times \frac{6.02 \times 10^{23} \text{개 C.H}}{1\text{mol C.H}} \times \frac{3\text{개 Cl}}{1\text{개 C.H}}$$

$$= 5.5 \times 10^{22} \text{개}$$



① $\text{g Cl} \rightarrow \text{mol Cl} : \underline{\text{mol Cl} = 35.5\text{g Cl}}$

② $\text{mol Cl} \rightarrow \text{개 Cl} : \text{mol} = 6.02 \times 10^{23} \text{개}$

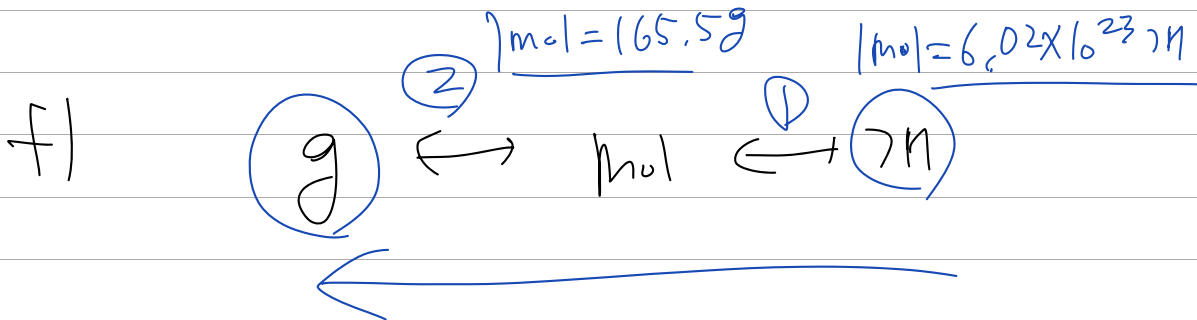
③ $3 \text{개 Cl} \rightarrow \text{개 C.H} : 1\text{개 C.H} = 3\text{개 Cl}$

④ $\text{개 C.H} \rightarrow \text{mol C.H} : \underline{\text{mol} = 6.02 \times 10^{23} \text{개}}$

⑤ mol (C.H) → g (C.H) ⇒ 1mol = 165.5 g C.H

$$1g \text{ Cl} \times \frac{1 \text{ mol Cl}}{35.5g \text{ Cl}} \times \frac{6.02 \times 10^{23} \text{ Cl}}{1 \text{ mol Cl}} \times \frac{12 \text{ C.H}}{3 \text{ mol Cl}} \times \frac{1 \text{ mol C.H}}{6.02 \times 10^{23} \text{ C.H}}$$

$$\times \frac{165.5 \text{ g C.H}}{1 \text{ mol C.H}} = 1.6 \text{ g}$$



$$\Rightarrow 500 \text{ mol C.H} \times \frac{1 \text{ mol C.H}}{6.02 \times 10^{23} \text{ C.H}} \times \frac{165.5 \text{ g C.H}}{1 \text{ mol C.H}}$$

$$= 1.313 \times 10^{-19} \text{ g}$$