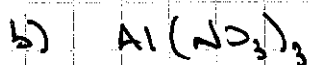


Oxidation Numbers



$$\begin{array}{|l} \text{O} = -2 \quad (\text{rule 3f}) \\ \text{S} = +4 \quad (\text{rule 5}) \end{array}$$

$$1\text{S} + 2\text{O} = 1(+4) + 2(-2) = 0$$



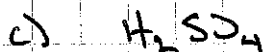
$$\begin{array}{|l} \text{Al} = +3 \quad (\text{rule 3c}) \\ \text{O} = -2 \quad (\text{rule 3f}) \\ \text{N} = +5 \quad (\text{rule 6}) \end{array}$$

$$\text{NO}_3^- : 1\text{N} + 3\text{O} = -1$$

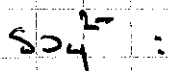
$$\text{N} + 3(-2) = -1$$

$$\text{N} - 6 = -1$$

$$\text{N} = +5$$



$$\begin{array}{|l} \text{H} = +1 \quad (\text{rule 3e} - \text{negative polyatomic ions are like non-metals}) \\ \text{O} = -2 \quad (\text{rule 3f}) \\ \text{S} = +6 \quad (\text{rule 6}) \end{array}$$



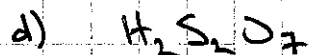
$$1\text{S} + 4\text{O} = -2$$

$$\text{S} + 4(-2) = -2$$

$$\text{S} - 8 = -2$$

$$\text{S} = +6$$

①



$$\text{H} = +1$$

(rule 3e - usually if H is at the front, it is +1)

$$\text{O} = -2$$

(rule 3f)

$$\text{S} = +6$$

(rule 5)

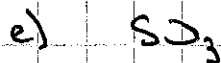
$$2\text{H} + 2\text{S} + 7\text{O} = 0$$

$$2(+1) + 2\text{S} + 7(-2) = 0$$

$$2 + 2\text{S} - 14 = 0$$

$$2\text{S} = 12$$

$$\text{S} = +6$$



$$\text{O} = -2$$

(rule 3f)

$$\text{S} = +6$$

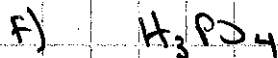
(rule 5)

$$\text{S} + 3\text{O} = 0$$

$$\text{S} + 3(-2) = 0$$

$$\text{S} - 6 = 0$$

$$\text{S} = +6$$



$$\text{H} = +1$$

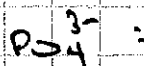
(rule 3e)

$$\text{O} = -2$$

(rule 3f)

$$\text{P} = +5$$

(rule 6)



$$\text{P} + 4\text{O} = -3$$

$$\text{P} + 4(-2) = -3$$

$$\text{P} - 8 = -3$$

$$\text{P} = +5$$



$$\begin{cases} O = -2 \\ P = +3 \end{cases}$$

(rule 3f)

(rule 5)

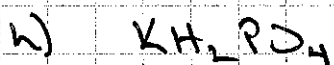
$$4P + 6O = 0$$

$$4P + 6(-2) = 0$$

$$4P - 12 = 0$$

$$4P = 12$$

$$P = +3$$



$$\begin{cases} K = +1 \\ O = -2 \\ P = +5 \\ H = +1 \end{cases}$$

(rule 3a)

(rule 3f)

(rule 6 - see below)

(rule 5 - see below)

$$PO_4^{3-} : P + 4O = -3$$

$$P + 4(-2) = -3$$

$$P - 8 = -3$$

$$P = +5$$

$$K + 2H + P + 4O = 0$$

$$1 + 2H + 5 + 4(-2) = 0$$

$$1 + 2H + 5 - 8 = 0$$

$$2H - 2 = 0$$

$$2H = 2$$

$$H = +1$$



$$\begin{array}{l} \boxed{F = -1} \quad (\text{rule 3d}) \\ \boxed{\text{Cu} = +2} \quad (\text{rule 5}) \end{array}$$

$$\text{Cu} + 2F = 0$$

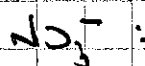
$$\text{Cu} + 2(-1) = 0$$

$$\text{Cu} - 2 = 0$$

$$\text{Cu} = +2$$



$$\begin{array}{l} \boxed{\text{H} = +1} \quad (\text{rule 3e}) \\ \boxed{\text{O} = -2} \quad (\text{rule 3f}) \\ \boxed{\text{N} = +5} \quad (\text{rule 6}) \end{array}$$

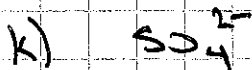


$$\text{N} + 3\text{O} = -1$$

$$\text{N} + 3(-2) = -1$$

$$\text{N} - 6 = -1$$

$$\text{N} = +5$$



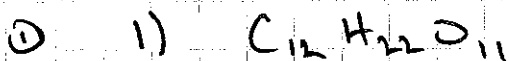
$$\begin{array}{l} \boxed{\text{O} = -2} \quad (\text{rule 3f}) \\ \boxed{\text{S} = +6} \quad (\text{rule 6}) \end{array}$$

$$\text{S} + 4\text{O} = -2$$

$$\text{S} + 4(-2) = -2$$

$$\text{S} - 8 = -2$$

$$\text{S} = +6$$



$$O = -2$$

(rule 3f)

$$H = +1$$

(rule 3e - when in doubt, H is usually +1)

$$C = 0$$

(rule 5)

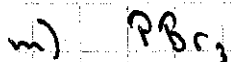
$$12C + 22H + 11O = 0$$

$$12C + 22(+1) + 11(-2) = 0$$

$$12C + 22 - 22 = 0$$

$$12C = 0$$

$$C = 0$$



$$Br = -1$$

(rule 3 - halogens are usually -1, though there are exceptions for all but Fluorine)

$$P = +3$$

(rule 5)

$$P + 3Br = 0$$

$$P + 3(-1) = 0$$

$$P - 3 = 0$$

$$P = +3$$



$$\begin{cases} O = -2 \\ C = +3 \end{cases}$$

(rule 3F)

(rule 6)

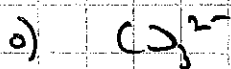
$$2C + 4O = -2$$

$$2C + 4(-2) = -2$$

$$2C - 8 = -2$$

$$2C = 6$$

$$C = +3$$



$$\begin{cases} O = -2 \\ C = +4 \end{cases}$$

(rule 3F)

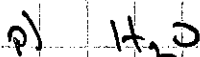
(rule 6)

$$C + 3O = -2$$

$$C + 3(-2) = -2$$

$$C - 6 = -2$$

$$C = +4$$



$$\begin{cases} O = -2 \\ H = +1 \end{cases}$$

(rule 3F)

(rule 3e / rule 5)

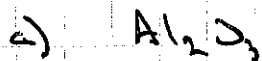
$$2H + O = 0$$

$$2H - 2 = 0$$

$$2H = 2$$

$$H = +1$$

②



$$Al = +3$$

(rule 3c)

$$\boxed{O = -2}$$

(rule 3f / rule 5)

$$2Al + 3O = 0$$

$$2(+3) + 3O = 0$$

$$6 + 3O = 0$$

$$3O = -6$$

$$O = -2$$



$$Ba = +2$$

(rule 3b)

$$\boxed{O = -1}$$

(rule 3f / rule 5)

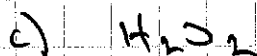
$$Ba + 2O = 0$$

$$2 + 2O = 0$$

$$2O = -2$$

$$O = -1$$

Name = barium peroxide



$$H = +1$$

(rule 3e)

$$\boxed{O = -1}$$

(rule 3f / rule 5)

$$2H + 2O = 0$$

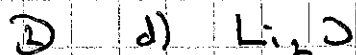
$$2(+1) + 2O = 0$$

$$2 + 2O = 0$$

$$2O = -2$$

$$O = -1$$

Name = hydrogen peroxide



$$\text{Li} = +1$$

(rule 3a)

$$\boxed{\text{O} = -2}$$

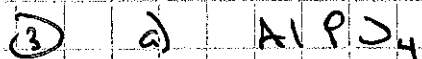
(rule 3f / rule 5)

$$2\text{Li} + \text{O} = 0$$

$$2(+1) + \text{O} = 0$$

$$2 + \text{O} = 0$$

$$\text{O} = -2$$



$$\text{Al} = +3$$

(rule 3c)

$$\text{O} = -2$$

(rule 3f)

$$\boxed{\text{P} = +5}$$

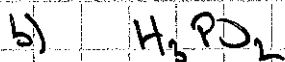
(rule 5)

$$\text{Al} + \text{P} + 4\text{O} = 0$$

$$(+3) + \text{P} + 4(-2) = 0$$

$$3 + \text{P} - 8 = 0$$

$$\text{P} = +5$$



$$\text{H} = +1$$

(rule 3e)

$$\text{O} = -2$$

(rule 3f)

$$\boxed{\text{P} = +1}$$

(rule 5)

$$3\text{H} + \text{P} + 2\text{O} = 0$$

$$3(+1) + \text{P} + 2(-2) = 0$$

$$3 + \text{P} - 4 = 0$$

$$\text{P} = +1$$

⊕ This question is about finding the lowest common multiple of the oxidation numbers of nitrogen and oxygen.

O = -2 in all oxides of nitrogen.

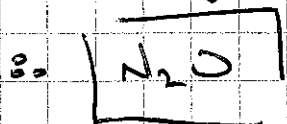
a) $N = +1$

LCM of +1 and -2 is 2

∴ you need 2 N (= +2)

and 1 O (= -2)

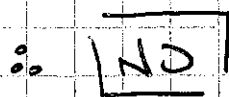
to get a neutral compound



b) $N = +2$

LCM of +2 and -2 is 2

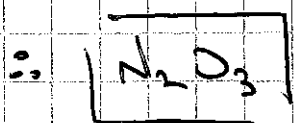
∴ need 1 N and 1 O



c) $N = +3$

LCM of +3 and -2 is 6

∴ need 2 N (= +6) and 3 O (= -6)

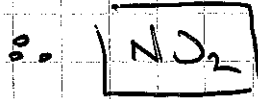


②

d) $N = +4$

LCM of $+4$ and -2 is 4

∴ Need $1N (= +4)$ and $2O (= -4)$



e) $N = +5$

LCM of $+5$ and -2 is 10

∴ Need $2N (= +10)$ and $5O (= -10)$

