

Chemical Equations & Laws

Teaching Task

Q1) Ans:- B

Solution:- According to law of conservation of mass

Mass of reactants = Mass of products

Mass of AgNO_3 + Mass of NaCl = Mass of NaNO_3 + Mass of AgCl .

$$34\text{g} + \text{Mass of NaCl} = 17\text{g} + 28.70\text{g}$$

$$\text{Mass of NaCl} = 17 + 28.7 - 34$$

$$= 45.7 - 34 = 11.7 \text{ gms.}$$

Q2) Ans:- C

Solution:- According to law of conservation of mass,

Total mass of reactants = Total mass of products.



Q3) Ans:- A

Solution:- If wood burns into air, it releases CO_2 , water vapour and other gases. So the mass of ash is less than the mass of wood.

Q4) Ans:- C

Solution:- Given, mass of Na = 46 gms
mass of H_2O = 36 gms.

mass of H_2 = 2 gms.

Mass of NaOH = ?

Mass of Na + Mass of H_2O = Mass of H_2 +
Mass of NaOH.

$$46 + 36 = 2 + \text{Mass of NaOH.}$$

$$\text{Mass of NaOH} = 82 - 2 = 80 \text{ gms}$$

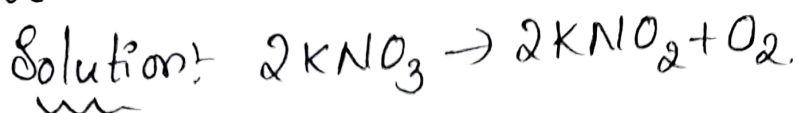
Q5) Ans:- B

Solution:- $2NaOH + (NH_4)_2SO_4 \rightarrow Na_2SO_4 + 3NH_3 + H_2O$
is not a balanced equation because.

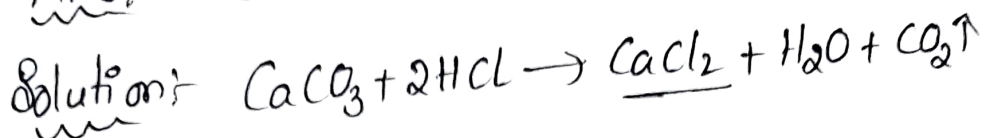
Element	L.H.S	R.H.S.
Na.	2	2
O	6	5.
H.	10	8.
N.	2	3.
S	1	1.

According Law of conservation of mass,
mass of reactants = mass of products. In the
above equation both are different. So it
an unbalanced equation.

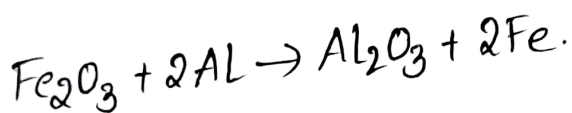
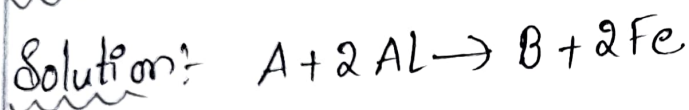
Q6) Ans:- C



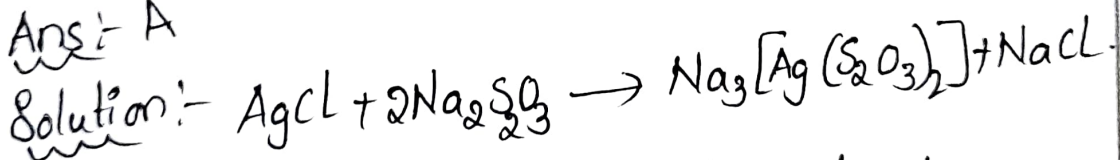
Q7) Ans:- C



Q8) Ans:- C



Q9) Ans:- A

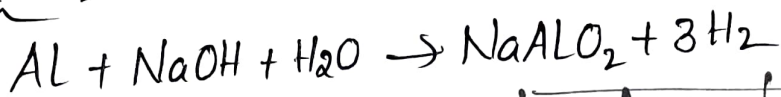


The above reaction is balanced only.

Element	L.H.S	R.H.S.
Ag	1	1
Cl	1	1
Na	4	4
S	4	4
O	6	6

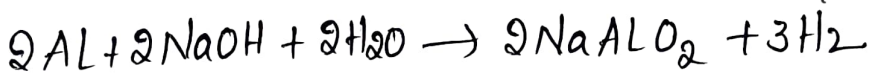
Q10) Ans:- B..

Solution:-



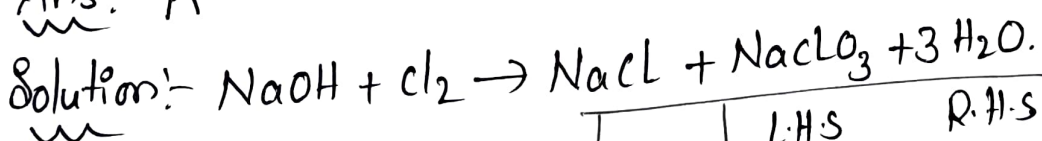
Multiply above equation
with '9'

	L.H.S	R.H.S.
Al	1	1
Na	1	1
O	2	2
H	3	(6)



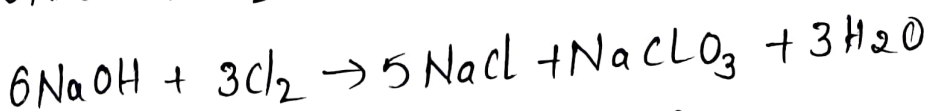
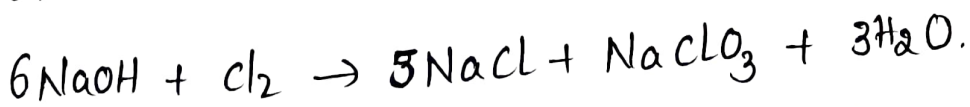
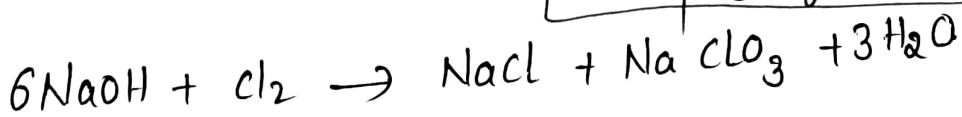
2 atoms of 'Na' on right side.

Q11) Ans:- A



Multiply NaOH with '6'.

	L.H.S	R.H.S
Na	① 6.	② 6
O	① 6.	6.
H	① 6.	6.
Cl	② $\times 3 = 6$.	② 6



There are 1 molecule of sodium
chlorate is present.

Q13) Ans: 3

Solution: According to law of reciprocal proportions, the weights of two elements combining with a fixed amount of the third element will bear the same ratio in which they themselves react.

Q12) Ans:- 4

Solution:-

Ferric sulphate is $\text{Fe}_2(\text{SO}_4)_3$. On heating, it decomposes to give SO_3 .

In SO_3 :-

Mass of Sulphur (S) = 32 g.

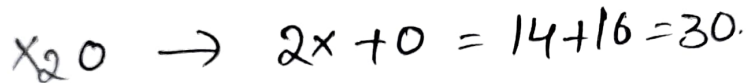
Mass of Oxygen (O) = 48 g.

The ratio $\text{O} : \text{S} = 48 : 32 = 3 : 2$

Q1.3)

Ans: 3

Solution: If X has an atomic weight of 7,



The total mass of X & O is 30, the formula matches $X = 14 \text{ gms}$, $O = 16 \text{ gms}$.

Q14) Ans:- 3

Solution:-

i)	% C	% H	Ratio
	75	25	$\rightarrow \frac{3}{75} : \frac{1}{25} = 3:1$
ii)	80	20	$\rightarrow \frac{4}{80} : \frac{1}{20} = 4:1$
iii)	85.7	14.3	$\rightarrow 85.7:14.3 = 6:1$
iv)	91.3	8.7	$\rightarrow 91.3:8.7 = 10.5:1$

Taking H = 1 gms, So the Carbon ratio is

3:4:6:10.5

It follows Law of multiple proportions

Q15.

Ans:- 3

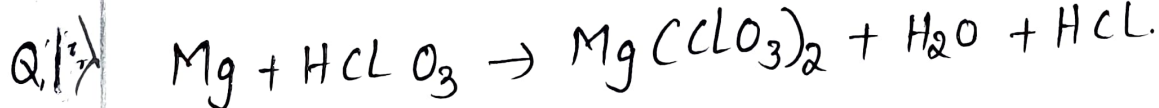
Solution:-

$\text{CuO} \rightarrow 1 \text{ Cu and } 1 \text{ oxygen.}$

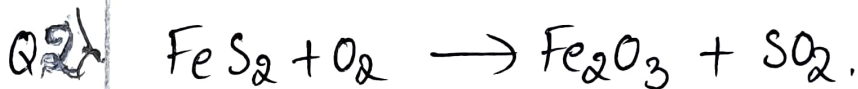
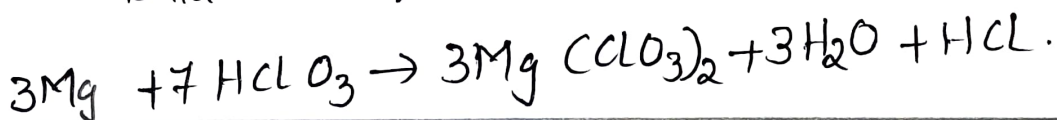
$\text{CuO}_2 \rightarrow 1 \text{ Cu and } 2 \text{ oxygen.}$

In these two compounds Cu combined with fixed masses of oxygen are in the ratio of 1:2

Balance the following

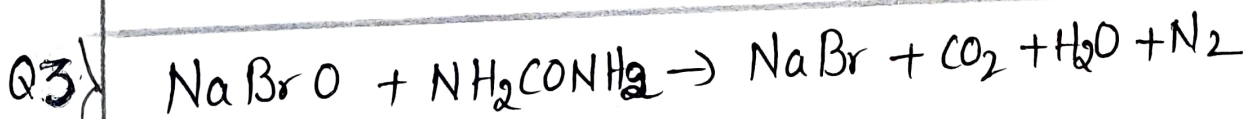
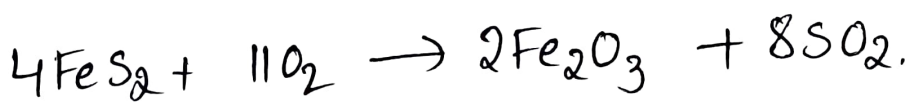


Balanced Equation

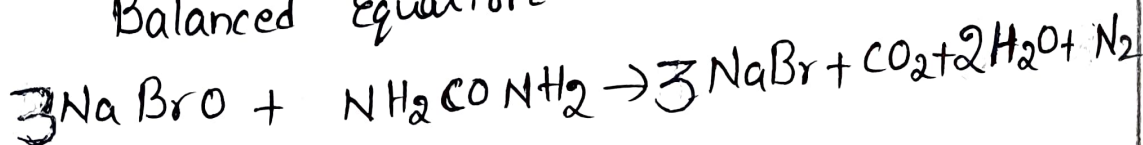


	L.H.S	R.H.S.
Fe	① 4	② 4.
S.	② 8	① 8.
O.	② 22	⑤ 22

Balanced equation.



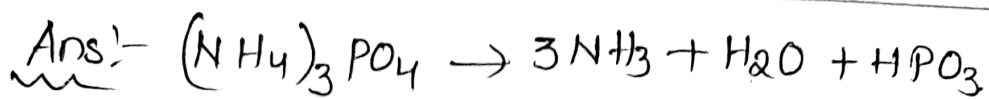
Balanced Equation.



Reason:-

	L.H.S	R.H.S.
Na	3	3
Br	3	3.
O	4	4
N	2	2
H	4	4
C	1	1

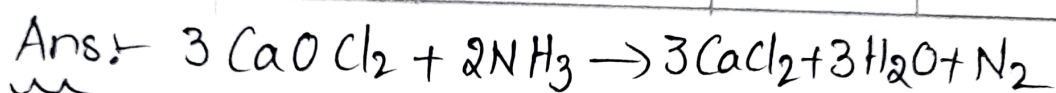
Q4)



Reason:-

	L.H.S	R.H.S
N.	3	3
H.	12.	12.
P	1	1
O	4	4.

Q5)



Solution:-

	L.H.S	R.H.S.
Ca	3	3.
O	3	3.
Cl	6	6.
N	2	2.
H	6	6.

JEE Advanced Level

Q25) Ans:- 1, 2, 3

Solution:- In A, B, C equations, Reactants are equal to products.

Q26) Ans:- 1, 2, 3, 4

Solution:- In all equations, reactants are equal to products.

Assertion Type

Q27) Ans:- 1

Solution:- $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$ is 1:1:2 ratio

Comprehension Type

Q29) Ans:- 3

Solution:- The % of hydrogen in H_2O is 11.2%.

and in H_2O_2 is 5.94%.

→ These consistent % of hydrogen in H_2O & H_2O_2 illustrate the law of multiple proportion.

$$\text{Ratio} = \frac{\% \text{ H in } \text{H}_2\text{O}}{\% \text{ H in } \text{H}_2\text{O}_2} = \frac{11.1}{5.9} = \frac{2}{1}$$

Q10) Ans:- 1

Solution:- Compound A.

$x \rightarrow 40\%$, $y \rightarrow 60\%$

$$x:y = 40:60 = 2:3.$$

$x \rightarrow 2$ moles , $y \rightarrow 3$ moles .

Compound B.

$$x:y = 25:75 = 1:3.$$

$x \rightarrow 1$ mole , $y \rightarrow 3$ moles.

y in Compound A & B is

In A, for 2 moles of x , y is 3 moles.

In B, for 2 moles of x , y is 6 moles.

$$3:6 = \underline{\underline{1:2}}$$

Integer Type

Q11) Ans:- 100 gms/mol.

Solution:- $\text{CaCO}_3 = 40 + 12 + 3(16)$
 $= 40 + 12 + 48 = 100 \text{ gm}.$

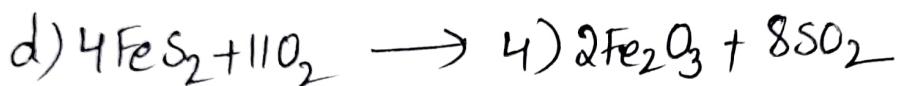
Q12) Ans:- 39.10 g/mol.

Solution:- Atomic weight of K is 39.10 g/mol.

Matrix Matching

Q20) Ans:- A (a-2, b-3, c-1, d-4)

Solution:-



Learner's Task

Q1) Ans:- C

Solution:- KClO_3

$$39 + 35.5 + 3(16) = 39 + 35.5 + 48 = 122.5$$

Q2) Ans:- A

Solution:- Balancing equations is necessary according to law of conservation of mass.

Q3) Ans:- A

Solution:- H_2SO_4

$$2(1) + 32 + 4(16) = 2 + 32 + 64 = 98$$

Q4) Ans:- B

Solution:- According to law of conservation of mass in a chemical reaction the atoms are neither created nor destroyed

Q5) Ans: A

Solution: The substances which take part in a chemical reaction are called reactants

Q6) Ans: C

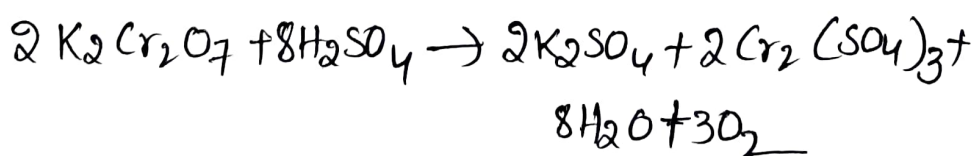
Solution: The number of places at which an element appears in a chemical reaction is called frequency or F-number

Q7) Ans: B

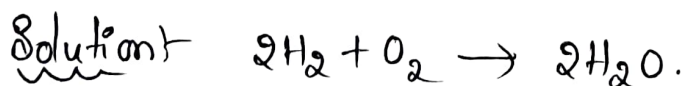
Solution: If the metal & non-metal have same frequency, first balance metal.

Q8) Ans: D

Solution: After balancing equation 2 Cr₂ are present on product side.



Q9) Ans: A

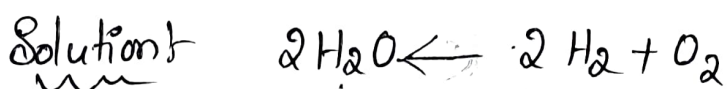


'2' - oxygen atoms are present after balancing.

Q10)

Ans:- C

Solution:-



Products Reactants

JEE Main Level

Q11

Ans:- B

Solution:- In a balanced equation no. of atoms on both sides are equal.

Q21

Ans:- B

Solution:- Mass of beaker A = 20 gms.

Mass of beaker B = 20 gms.

Total mass of reactants & beakers = 50 gms.

Reactants + A + B = 50 gms.

Reactants + 20 + 20 = 50

Reactants = 50 - 40 = 10 gms.

The student pour total reactant in 1 beaker.

Now weight = Reactants + Mass of beaker A.

= 10 + 20 = 30 gms.

Q9)

Ans:- C

Solution:- In CuO , 1 Cu reacts with 1 oxygen
1:1

In Cu_2O , 2 Cu and 1 oxygen.

The ratio of Cu in CuO & Cu_2O is 1:2

Q10)

Ans:- D

Solution:- In the pair of N_2O & NO , Nitrogen
ratio is 2:1.

Q11)

Ans:- A

Solution:- SO_2 ,

$\text{S} \rightarrow 32$, $\text{O} \rightarrow 2 \times 16 = 32$

In SO_3

$\text{S} \rightarrow 32$, $\text{O} \rightarrow 3 \times 16 = 48$.

Oxygen ratio in SO_2 & $\text{SO}_3 = \frac{32}{2} : \frac{48}{3}$

$= 2:3$

Q12)

Ans:- B.

Solution:- In different sample of CO_2 ,
the ratio of C & O = $12:32 = 3:8$.

i.e. called law of definite proportion.

Q13) Ans:- D.

Solution:- Nitrogen with oxygen in N_2O & NO .
2:1

Balance the following

Q14) Ans:- $3Fe + 4N_2O \rightarrow 4N_2 + Fe_3O_4$.

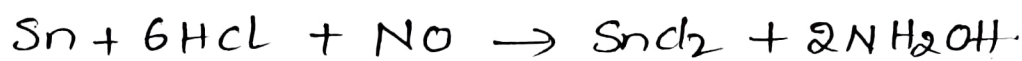
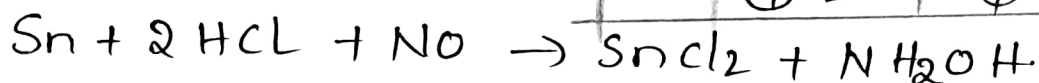
Solution:-

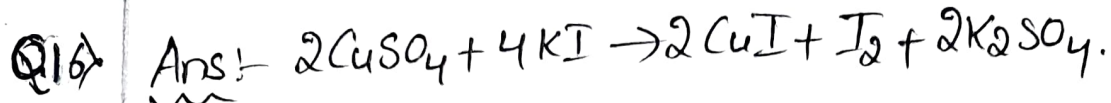
	L.H.S	R.H.S.
Fe	3	3
N ₂	8	8.
O	4	4.

Q15) Ans:- $3Sn + 6HCl + 2NO \rightarrow 3SnCl_2 + 2NH_2OH$

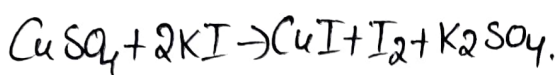
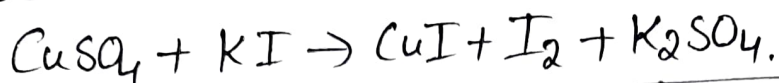
Solution:- $Sn + HCl + NO \rightarrow SnCl_2 + NH_2OH$

	L.H.S	R.H.S
Sn	① 3	① 3.
H	① ② 6	③ 6.
Cl	① ② 6	② 6
N	① 2	① 2
O	① 2	① 2

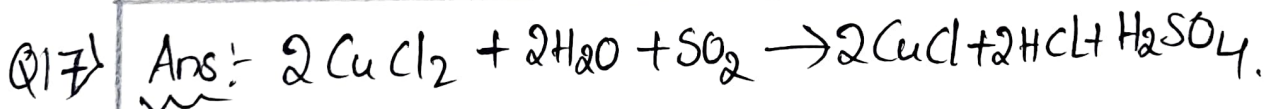
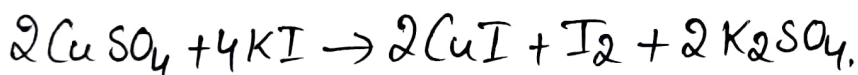
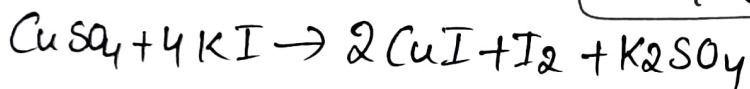




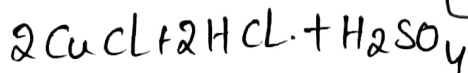
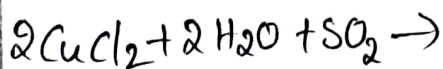
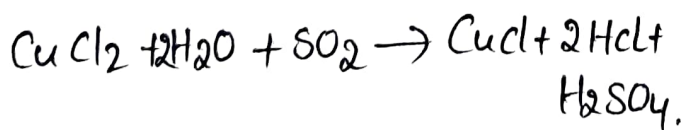
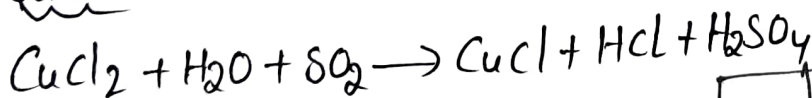
Solution:-



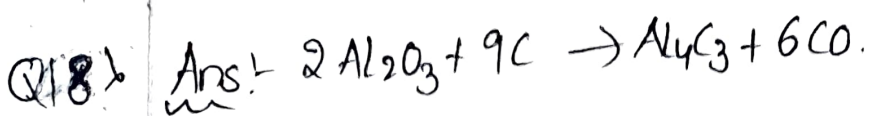
	L.H.S	R.H.S.
Cu	① 2	① 2
S	① 2	① 2
O	④ 8.	④ 8.
K	① 2 4	② 4
I	① 2 4.	③ 4



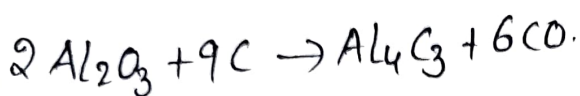
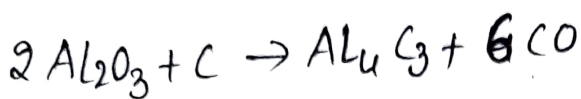
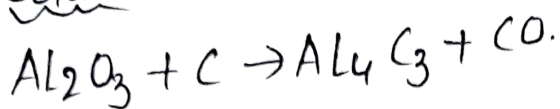
Solution:-



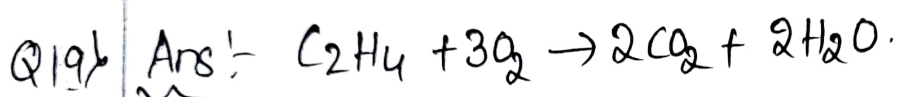
	LHS	RHS
Cu	① 2	① 2
Cl	② 4	② ③ 4
H	② 4	③ 4.
O	③ 4.	4
S	1	1



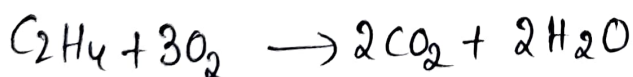
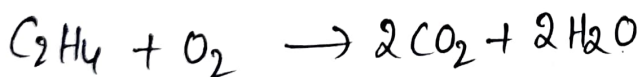
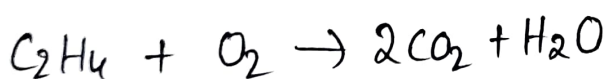
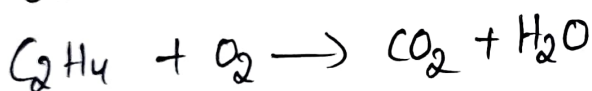
Solution:-



	L.H.S	R.H.S.
Al	②4	4
O	③6	①6
C	①9	④9



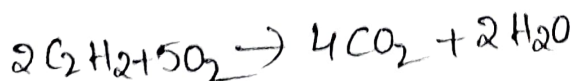
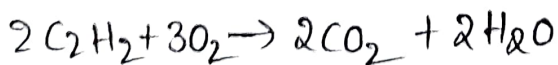
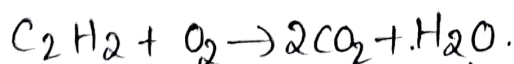
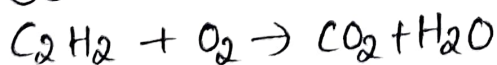
Solution:-



	L.H.S	RHS
C	2	①2
H	4	②4
O	②6	③6

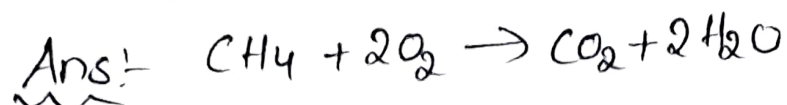


Solution:-

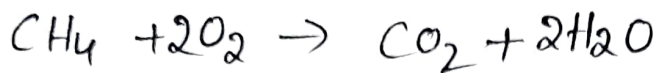


	L.H.S	R.H.S
C	②4	①②4
H	②4	②4
O	②6 10	③5 10

Q21)

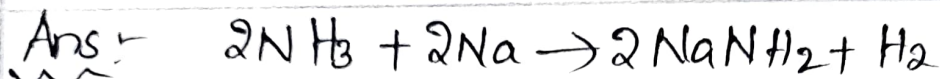


Solution:-

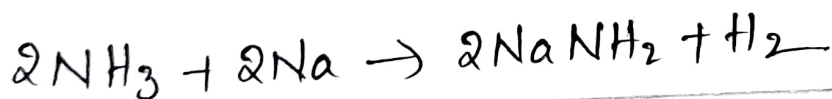
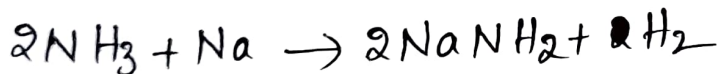
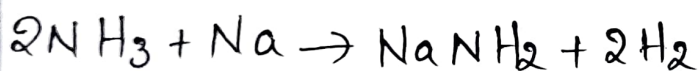
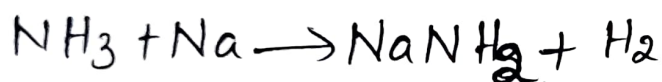


	L.H.S	R.H.S.
C	1	1
H	4	(2) 4.
O	(2) 4.	(3) 4.

Q22)

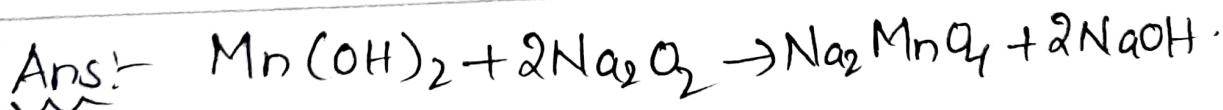


Solution:-

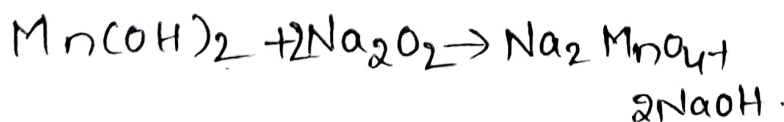
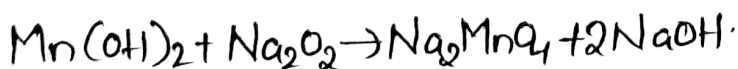
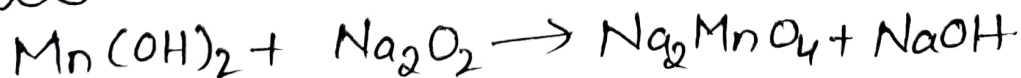


	L.H.S	R.H.S
N	(1) 2	(1) 2
H	(3) 6	(4) 6.
Na	1	(1) 2

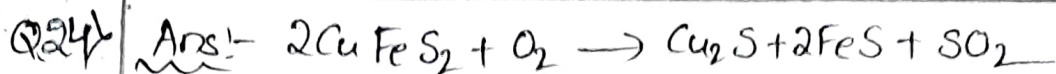
Q23)



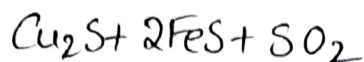
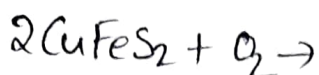
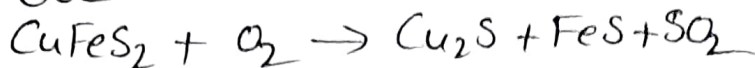
Solution:-



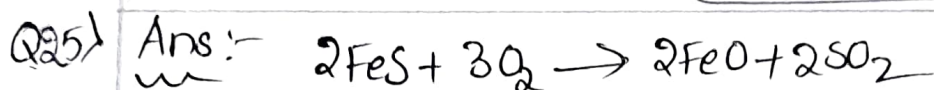
	L.H.S	R.H.S
Mn	(1)	1
O	(4) 6	(5) 6
H	(2)	(1) 2
Na	(2) 4	(1) (3) 4



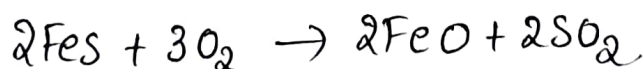
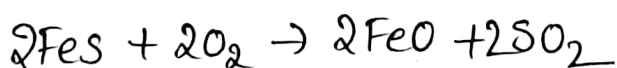
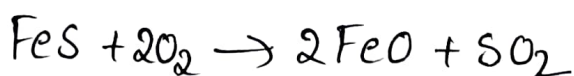
Solution:-



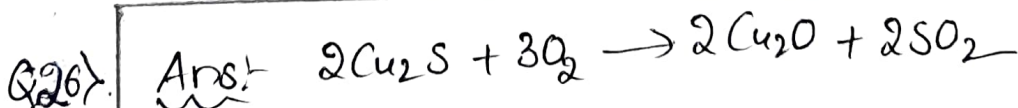
	L.H.S	R.H.S.
Cu	① 2	2
Fe	① 2	① 2
S	② 4	③ 4
O	2	2



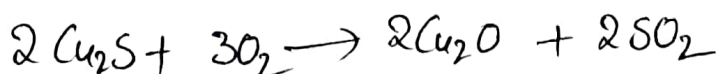
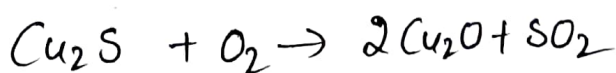
Solution:-



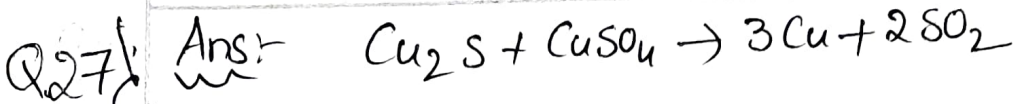
	LHS	RHS.
Fe	① 2	① 2
S	① 2	① 2
O	② 4 6	③ 4 6



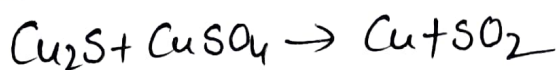
Solution:-



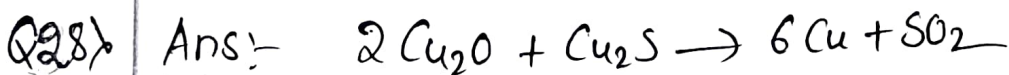
	LHS	RHS.
Cu	② 4	② 4
S	① 2	① 2
O	② 6	③ 4 6



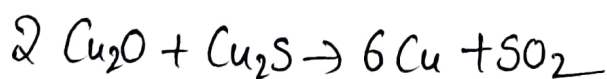
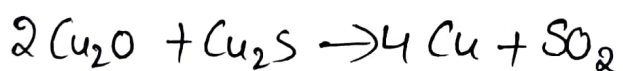
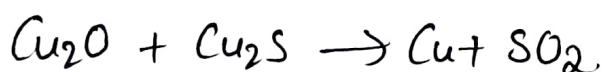
Solution:-



	L.H.S	R.H.S
Cu	3	①3
S	2	①2
O	4	②4

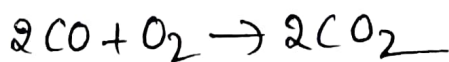
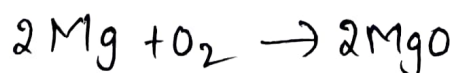
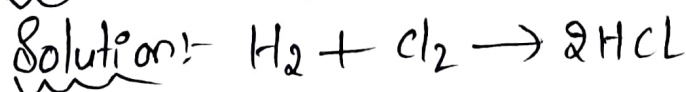
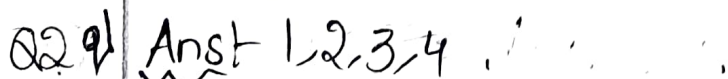


Solution:-

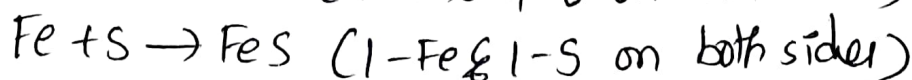


	LHS	RHS
Cu	④6	①④6
O	①2	2
S	1	1

JEE Advanced level



(2-C & 4-O on both sides)



	L.H.S	R.H.S
H	2	2
Cl	2	2

	L	R
Mg	2	2
O	2	2

Q30) Ans:- 1, 4

Solution:- The above reaction tells about the symbols and formulae and also explains the no. of atoms and molecules. It doesn't tell the physical states and physical condition of a reaction on the arrow.

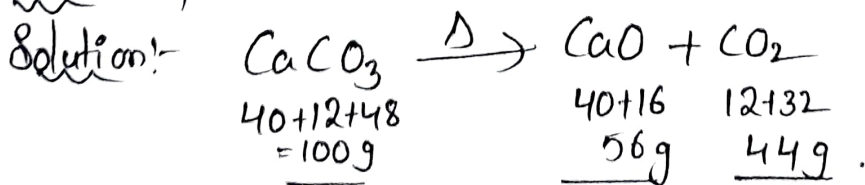
Q31) Ans:- 3

Solution:- A balanced chemical equation typically shows the reactants and products & their stoichiometric ratios but does not always specify all physical conditions.

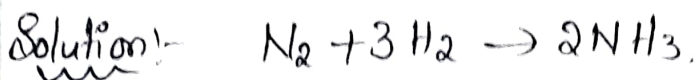
Q32) Ans:- 1

Solution:- $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$ is a balanced equation because the no. of atoms in reactant is equal to the no. of atoms in product.

Q33) Ans:- 4



Q34) Ans:- 4

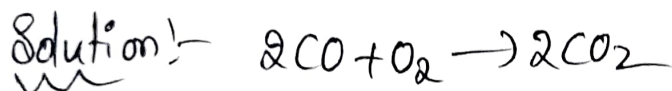


$$\begin{array}{ccc} 28 & 6 & 2[14+3] \\ 28+6 = 34 \text{ gms} & & = 34 \text{ gms} \end{array}$$

→ 4 Molecules of reactants, 2 molecules of products.

→ 8 atoms of reactants & 8 atoms of products.

Q35) Ans:- 2

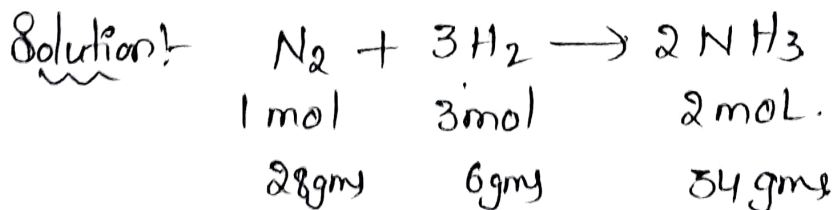


For the given equation all information is correct. Option B is practically incorrect because of half molecule.

Q36) Ans:- 1

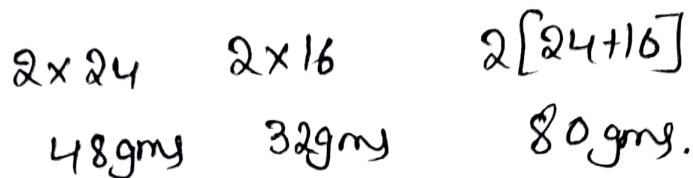
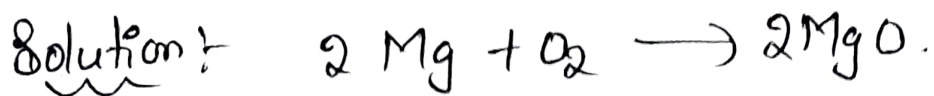
Solution:- A balanced equation gives information about the no. of atoms of all substances involved in the reaction.

Q37) Ans:- 3



1 gram of N_2 not able to react with 3 grams of H_2 .

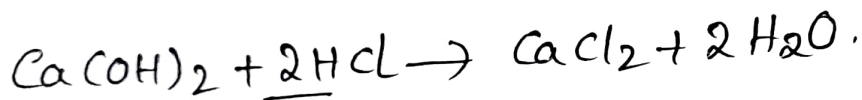
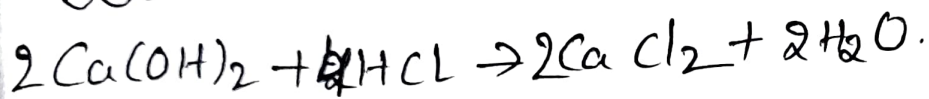
Q38) Ans:- 4



Integer type

Q39) Ans:- 2

Solution:-



Matrix Matching

Q40) Ans:- a-4 , b-1 , c-2 , d-3. [B or C]

Solution:-

1) The substance which take $\rightarrow$ 4) Reactant part in chemical reaction

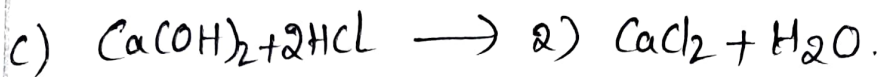
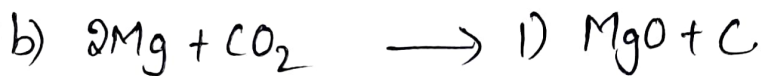
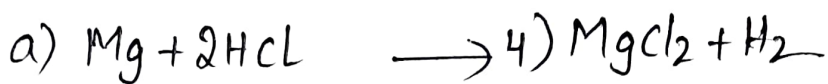
2) The substance which formed in chemical reaction $\rightarrow$ 1) Product.

3) A chemical equation in which no. of atoms on reactants & products are same $\rightarrow$ 2) Balanced chemical equation.

4) $\text{Ca(OH)}_2 + 2 \text{HCl} \rightarrow$ 3) $\text{CaCl}_2 + \text{H}_2\text{O}$.

Q41). Ans:- a-4 , b-1 , c-2, d-3.

Solution:-



10. CHEMICAL EQUATIONS AND LAWS KEY

TEACHING TASK

JEE MAINS LEVEL QUESTIONS

1	2	3	4	5	6	7	8	9	10
B	C	A	C	B	C	C	C	A	B
11	13	12	13	14	15				
A	3	4	3	3	3				

JEE ADVANCED LEVEL QUESTIONS

25	26	27	9	10	11	12	20
1,2,3	1,2,3,4	1	3	1	100	39.1 A	

LEARNERS TASK

Conceptual Understanding Questions (CUQ's)

1	2	3	4	5	6	7	8	9	10
C	A	A	B	A	C	B	D	A	C

JEE MAINS LEVEL QUESTIONS

1	2	3	4	5	6	7	8	9	10
B	B	B	D	D	A	B	C	C	D
11	12	13							
A	B	D							

JEE ADVANCED LEVEL QUESTIONS

29	30	31	32	33	34	35	36	37	38
1,2,3,4	1,4	3	1	4	4	2	1	3	4
39	40	41	42						
2 B OR C	a-4,b-1,c-2,d-3								