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6. FORMULA

SOLUTIONS

TEACHING TASK

JEE MAINS LEVEL QUESTIONS

1. Which of the following compounds cannot be correctly represented using the criss-cross method?

a. KCl **b. Na_2S** **c. Fe_3O_4** **d. H_2O**

Answer:D

Solution:The criss-cross method is used for ionic compounds (e.g., KCl, Na_2S, Fe_3O_4). H_2O (water) is a covalent compound, so it cannot be correctly represented using this method.

2. If the criss-cross method is applied to the combination of potassium (K^+) and phosphate (PO_4^{3-}) ions, what is the correct formula for the resulting compound?

a. K_3PO_4 **b. K_2PO_4** **c. KPO_4** **d. K_4PO_4**

Answer:A

Solution:K^+ (charge +1) and PO_4^{3-} (charge -3).
Criss-cross gives K_3PO_4.

3. If sodium (Na) combines with phosphorus (P) using the criss-cross method, what is the correct formula for the resulting compound?

a. NaP **b. Na_3P** **c. Na_2P_3** **d. NaP_2**

Answer:B

Solution:Na^+ (charge +1) and P^{3-} (charge -3).
Criss-cross gives Na_3P

4. If the criss-cross method results in a fraction as a subscript, what should be done?

a. Round up the fraction to the nearest whole number
b. Multiply all subscripts by a common factor to eliminate the fraction
c. Leave the fraction as it is **d. Replace the fraction with 1**

Answer:B

Solution:Multiply all subscripts by a common factor to eliminate the fraction

Example: $Mg^{2+} + O^{2-} \rightarrow Mg_2O_2 \rightarrow$ Simplify to MgO.

5. When using the criss-cross method, what does a coefficient outside the parentheses represent?

a. The number of molecules b. The number of atoms

c. The number of moles d. The number of electrons involved in bonding

Answer:A

Solution:The number of molecules — a coefficient outside parentheses multiplies whole formula units (molecules/formula units)

6. Select the correct formula for each of the following compounds:

i) Calcium carbonate ii) Calcium hydrogen carbonate

(i)	(ii)	(i)	(ii)
A) $Ca(OH)_2$	**$CaCO_3$**	**B) $CaCO_3$**	**$Ca(HCO_3)_2$**
C) $CaCO_3$	**$Ca(OH)_2$**	**D) $Ca(HCO_3)_2$**	**$Ca(OH)_2$**

Answer:B

Solution:

i) Calcium carbonate -$CaCO_3$

ii) Calcium hydrogen carbonate- $Ca(HCO_3)_2$

7. Number of electrons transfer takes place from magnesium to oxygen in the formation of magnesium oxide.

A) 4 B) 3 C) 2 D) 1

Answer:C

Solution:Mg loses 2 electrons ($Mg \rightarrow Mg^{2+} + 2e^-$).

8. Name of the molecule that will form from two sodium atoms, one carbon atom and three oxygen atoms

A) Sodium Oxide B) Sodium Carbon trioxide

C) Sodium Carbonate D) Sodium Carbon dioxide

Answer:C

Solution:Sodium Carbonate (Na_2CO_3)

9. The chemical formulae of a compound shows the

A) arrangement of atoms in the compound

B) mass of atoms in each of its molecule

C) number of atoms that have chemically combined in a molecule

D) number of atoms that have been mixed physically mixed in a molecule.

Answer:C

Solution:The chemical formula of a compound shows the Number of atoms that have chemically combined in a molecule.

10. Formula for calcium carbonate is

A) $CaCO_3$ B)$CaHCO_3$ C) Na_2CO_3 D)$CuCO_3$

Answer:A

Solution:Formula for calcium carbonate is $CaCO_3$

11. A metal M forms a compound M_2HPO_4.What will be the formula of the metal suphate?

A)M_2SO_4 B)MSO_4 C)M_3SO_4 D)M_4SO_4

Answer:A

Solution:

M_2SO_4 — from M_2HPO_4 infer M is +1, so sulfate with SO_4^{2-} gives M_2SO_4

12. If the formula of a metal nitrite is $M(NO_2)_2$ then the formula of its dihydrogen phosphate is

A)$M_2(PO_4)_3$ B)$MHPO_4$ C) $M(H_2PO_4)_2$ D)M_2HPO_4

Answer:C

Solution:$M(NO_2)_2$ suggests M has a +2 charge (since NO_2^- has -1).

Dihydrogen phosphate ($H_2PO_4^-$) would form $M(H_2PO_4)_2$.

13. The chemical formula of potassium per-chlorate is

A) KClO B) $KClO_2$ C) $KClO_3$ D) $KClO_4$.

Answer:D

Solution:Perchlorate ion is ClO_4^-, so the formula is $KClO_4$.

JEE ADVANCED LEVEL QUESTIONS

MULTICORRECT TYPE

1. Which of the following are correct statement

A) The chemcial formula of water is H_2O

B) The chemical formula of Sulphuric acid is H_2SO_4

C) The chemical formula of carbonic acid is H_2CO_2 D) All the above

Answer:A,B

Solution:Option A (H_2O): Correct. Water is indeed H_2O.

Option B (H_2SO_4): Correct. Sulphuric acid's formula is H_2SO_4.

Option C (H_2CO_2): Incorrect. The correct formula for carbonic acid is H_2CO_3, not H_2CO_2.

2. which of the following are di atomic molecules?

A)Cl_2 B)Br_2 C)I_2 D)O_2

Answer:A,B,C,D

Solution:Diatomic molecules consist of two atoms of the same element. The given options are all examples of diatomic molecules:

Cl_2 (Chlorine): Diatomic

Br_2 (Bromine): Diatomic

I_2 (Iodine): Diatomic

O_2 (Oxygen): Diatomic

REASON AND ASSERTION TYPE

A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion.

B) Both Assertion and Reason are true, but Reason is NOT the correct expla nation for Assertion.

C) Assertion is true, but Reason is false.

D) Assertion is false, but Reason is true.

3. Assertion: The criss-cross method is used to determine the ratio of ions in an ionic compound.

Reason: The charges on ions in an ionic compound must balance to achieve a neutral compound.

Answer:A

Solution:The Assertion is true (criss-cross method gives the ion ratio).

The Reason is true (ionic compounds must be neutral).

The Reason correctly explains the Assertion because the criss-cross method works precisely to balance charges.

4. Assertion: The criss-cross method involves swapping the numerical charges of the ions to determine the subscript in the chemical formula.

Reason: The subscript in a chemical formula represents the number of ions of each type needed to balance the overall charge.

Answer:A

Solution: Swapping numerical charges directly determines the subscripts that give the correct ratio of ions

5. Assertion: The criss-cross method is not applicable to covalent compounds like CH_4.

Reason: Covalent compounds involve shared electrons, and the criss-cross method is specifically designed for ionic compounds.

Answer:A

Solution:The Assertion is true (criss-cross doesn't work for covalent compounds).

The Reason is true (covalent compounds share electrons; criss-cross is for ionic bonds).

The Reason directly explains why the Assertion is true.

6. Assertion: The criss-cross method facilitates the prediction of formulas for ionic compounds with polyatomic ions like NH_4^+ and SO_4^{2-}.

Reason: Treating polyatomic ions as single units, the criss-cross method determines the overall formula by exchanging charges.

Answer:A

Solution:The Assertion is true (criss-cross works for polyatomic ions, e.g., $(NH_4)_2SO_4$).

The Reason is true (polyatomic ions are treated as single charged units).

The Reason correctly explains the Assertion—it describes how criss-cross applies to polyatomic ions.

STATEMENT TYPE

A) Statement-I and Statement-II are True
B) Statement - I and Statement-II are False
C) Statement - I is True, Statement - II , is False
D) Statement - I is False, Statement - II is True

7. *Statement I :* PCl_5 stands for phosphorous penta chloride.
***Statement II* :SO_3 stands for sulphur trioxide**

Answer:B

Solution:True — "PCl_5" is indeed the correct formula and
name for phosphorus pentachloride.
Statement II:oTrue — "SO_3" is correctly named as sulfur trioxide.
Now, check if Statement II explains Statement I.It does not — They are independent facts, not an explanation of each other

COMPREHENSION TYPE

Comprehension-1:

In chemistry, the criss-cross method is a technique used to determine the chemical formula of an ionic compound when the names of the ions are provided. Ionic compounds are formed by the combination of positively charged ions (cations) and negatively charged ions (anions). The criss-cross method involves crossing over the numerical values of the charges on the ions to obtain the subscripts in the chemical formula.

8. Determine the chemical formula for the ionic compound formed by combining calcium ions and Sulphate Ions

a) $CaSO_4$ b) Ca_2SO_4 c) $Ca(SO_4)_2$ d) $Ca_2(SO_4)_2$

Answer:A

Solution:Calcium ion: Ca^{2+} , Sulfate ion: SO_4^{2-}

Criss-cross method:Write the charges:

Ca^{2+} | SO_4^{2-}

Swap the numbers (ignoring signs):

Subscript for Ca = 2 (from SO_4^{2-})

Subscript for SO_4 = 2 (from Ca^{2+})

Simplify if possible:

Both subscripts are 2, but since they are identical, they cancel out (no need to write "1").

Final formula: $CaSO_4$

9. What is the correct formula for the ionic compound formed between calcium (Ca) and bromine (Br)?

A. CaBr **B. $CaBr_2$** **C. Ca_2Br** **D. $CaBr_3$**

Answer:B

Charges: Ca^{2+}, Br^-

Criss-cross $\rightarrow$ 1 Ca, 2 Br $\rightarrow$ $CaBr_2$.

10. What is the correct chemical formula for the compound formed by the combination of iron(II) ions and phosphate ions?

A. $Fe_3(PO_4)_2$ **B. $Fe_3(PO_4)_4$** **C. Fe_2PO4_3** **D. Fe_3PO4_2**

Answer:A

Solution:Charges: Fe^{2+}, PO_4^{3-}

Criss-cross $\rightarrow$ $Fe_3(PO_4)_2$.

11. Determine the chemical formula for the compound formed between strontium ions and phosphate ions

A. $Sr_2(PO_4)_3$ **B. $SrPO_4$** **C. $Sr_3(PO4)_2$** **D. $Sr(PO_4)_2$**

Answer:C

Solution:Charges: Sr^{2+}, PO_4^{3-}

Criss-cross $\rightarrow$ $Sr_3(PO_4)_2$

Comprehension -2

The representation of a molecule of a substance in terms of symbols & subscripts numbers is known as formule. The representation of a molecule of a substance (element or compoun4) in terms of symbols and subscript numbers is known as the formula.

12. A metal M forms a compound MPO_4. What will be the formula of the metal sulphate?

A) M_2SO_4 B) $M_2(SO_4)_3$ C) MSO_4 D) $M(SO_4)_3$

Answer:B

Solution:PO_4^{3-} has a charge of -3.

If the formula is MPO_4, that means 1 atom of M balances the -3 charge, so M must be +3.

Sulphate = SO_4^{2-}.

Criss-cross M^{3+} and $SO_4^{2-} \rightarrow M_2(SO_4)_3$

13. The phosphate of a metal has the formula MPO_4. The formula of its nitrate will be:

A) MNO_3 B) $M_2(NO_3)_2$ C) $M(NO_3)_2$ D) $M(NO_3)_3$

Answer:D

Solution:As above, M is +3.

Nitrate = NO_3^-.

Criss-cross M^{3+} and $NO_3^- \rightarrow M(NO_3)_3$

MATRIX MATCH TYPE:

14. Column- I	**Column-II**
a. Periodic acid	**1) $HClO_3$**
b. Chloric acid	**2) $HClO_2$**
c. Chlorous acid	**3) $HClO_4$**
d. Per chloric acid	**4) HIO_3**
	5) HIO_4

Answer:a-5,b-1,c-2,d-3

Solution:

a. Periodic acid	5) HIO_4
b. Chloric acid	1) $HClO_3$
c. Chlorous acid	2) $HClO_2$
d. Per chloric acid	3) $HClO_4$

15. Column- I	**Column-II**
a) Mercurous chloride	**1) $PbCrO_4$**
b) Lead chromate	**2) $CaOCl_2$**
c) Solid carbondioxide	**3) CO_2**
d) Calcium oxychloride	**4) Hg_2Cl_2**
	5) H_2SO_4

Answer:a-4,b-1,c-3,d-2

Solution:a) Mercurous chloride	4) Hg_2Cl_2
b) Lead chromate	1) $PbCrO_4$
c) Solid carbondioxide	3) CO_2
d) Calcium oxychloride	2) $CaOCl_2$

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)

1. In the criss-cross method, what do the numerical subscripts represent in a chemical formula?

a. Number of moles **b. Atomic masses**

c. Charge of ions **d. Number of atoms**

Answer:D

Solution:The subscripts show how many atoms of each element are present in the compound.

2. Formula for the radicals magnesium and sulphide

A) Mg_2S_3 **B) MgS** **C) Mg_3S_2** **D) MgS_2**

Answer:B

Solution:$Mg^{2+} + S^{2-} \rightarrow MgS$ (charges cancel out).

3. The chemical formula of Potassium super oxide is

A) KO_2 **B) K_2O** **C) K_2O_2** **D) KO**

Answer:A

Solution: KO_2 Superoxide contains the O_2^- ion.

4. In a binary compound, metallic part is given a suffix as?

A) ate **B) ite** **C) ide** **D) None**

Answer:C

Solution:Binary compounds end with "-ide" (e.g., sodium chloride).

5. In a binary compound, the metal ion is

A) Named second **B) Cannot be named**

C) Named first with the metal name D) Both a and b

Answer:C

Solution:The metal is always named first in ionic compounds.

6. What is name of the $NaNO_3$ tertiary compound?

A) Sodium nitrite **B) Sodium nitride**

C) Sodium nitrate **D) None**

Answer:C

Solution:NO_3^- is the nitrate ion.

7. What is the prefix if oxygen is less than the oxygen present in a compound?

A) Per **B) Hypo** **C) Hyper** **D) All**

Answer:B

Solution:"Hypo-" indicates fewer oxygen atoms (e.g., hypochlorite).

8. If Oxygen present in a compound ending with –ate, contains more oxygen than is:

A) Per B) Hypo C) Hyper D) All

Answer:A

Solution:"Per-" indicates more oxygen (e.g., perchlorate).

9. The prefix and suffix in binary acids containing hydrogen and non metal like halogen respectively are:

A) Hydro and ic B) ic and hydro C) ate, ite D) ite, ate

Answer:A

Solution:Binary acids: prefix “hydro-” + nonmetal root + “-ic acid”.

10. In naming bases –OH radical are named as hydroxides, after the name of:

A) Metal, B) Non-metal C) Both a and b D) None

Answer:A

Solution:Hydroxides are named after the metal.

11. What is trivial name of sodium chloride?

A) Ammonia B) Table salt C) Baking salt D) Water

Answer:B

Solution: Table salt-common name for NaCl

JEE MAINS LEVEL QUESTIONS

1. What is the criss-cross formula for the compound formed between potassium (K) and phosphorus (P)?

a. K_2P b. K_3P c. KP d. K_2P_3

Answer:B

Solution:K^+ and P^{3-}

Criss-cross gives K_3P

2. What is the criss-cross formula for the compound formed between aluminum (Al) and sulfur (S)?

a. Al_2S_3 b. AlS_2 c. Al_3S d. AlS_3

Answer:A

Solution:Al^{3+} and S^{2-}

Criss-cross gives Al_2S_3

4. Chemical formula for calcium sulphate is $CaSO_4$. The formula for ferric sulphate will be:

A) $Fe_2(P_2O_7)_3$ B) $Fe_4P_3O_{14}$ C) $Fe_2(SO_4)_3$ D) Fe_3PO_4

Answer:C

Solution:Ferric = Fe^{3+}, Sulphate = SO_4^{2-}
Criss-cross gives $Fe_2(SO_4)_3$

5. A metal M forms a compound M_2HPO_4. What will be the formula of the metal sulphate?

A) M_2SO_4 B) $M_2(SO_4)_3$ C) MSO_4 D) $M(SO_4)_3$

Answer:A

Solution:HPO_4^{2-} implies metal is M^+

Sulphate (SO_4^{2-}) with M^+ gives M_2SO_4

6. A formula has

A) Qualitative significance only
B) Quantitative significance only
C) Both qualitative and quantitative significance. D) None of these

Answer:C

Solution:Formula Shows both elements (qualitative) and their ratios (quantitative)

7. The symbolic representation of actual number of atoms in molecule is called

A) Valency B) Formula C) Both 1 & 2 D) Ion

Answer:B

Solution:Actual number of atoms in a molecule is given by the formula

8. The chemical formula of water is

A) H_2O_2 B) H_2O C) O_2 D) H_2

Answer:B

Solution:Chemical formula of water is H_2O

9. The valency of tin in $SnCl_2$ is A_____ and SnCl4 is B_____.

A)A-2,B-4 B) A-4, B-2 C)A-1,B-1 D) A- 2,B-2

Answer:A

Solution:$SnCl_2$: Sn^{2+} (valency 2)
$SnCl_4$: Sn^{4+} (valency 4)

10. Identify the right chemical formula for the following compounds.

i) Calcium sulphate	**ii) Magnesium oxide**	**iii) Potassium nitrite**
i	***ii***	***iii***
A) $Ca(HSO_4)_2$	**MgO**	**KNO_3**
B) $CaSO_4$	**MgO**	**KNO_2**
C) CaS	**Mg_2O_2**	**KNO_3**
D) None of the above		

Answer:B

Solution:i) Calcium sulphate = $CaSO_4$
ii) Magnesium oxide = MgO iii) Potassium nitrite = KNO_2

11. Correct formula of a trivalent metal nitride is:

A) M_3N_2 B) M_3N_3 C) MN D) Both B and C

Answer:D

Solution:Trivalent metal (M^{3+}) + Nitride (N^{3-}):
Simplest formula: MN (1:1 ratio).
Alternatively: M_3N_3 (empirically same as MN).

12. Metal sulphate of a metal 'M' is written as $M_2(SO_4)_3$ then its metal chloride is

A)MCl B) MCl_2 C) MCl_3 D) None

Answer:C

Solution:From $M_2(SO_4)_3$, metal is M^{3+}
Chloride would be MCl_3

13. The sulphate of a metal has the formula $M_2(SO_4)_3$. The formula for its phosphate will be

A) $M(HPO_4)_2$ B)$M_3(PO_4)_2$ C)$M_2(PO_4)_3$ D)MPO_4

Answer:D

Solution:
$M^{3+} + PO_4^{3-} \rightarrow MPO_4$

ADVANCED LEVEL QUESTIONS

MULTICORRECT TYPE

1. In which of the following compounds metal is having valency 1?

A) NaCl B) LiCl C) $MgCl_2$ D) CsCl

Answer:A,B,D

Solution:Valency 1 means the metal forms a +1 ion.
Na (Sodium) in NaCl $\rightarrow$ Na^+ (valency = 1)
Li (Lithium) in LiCl $\rightarrow$ Li^+ (valency = 1)
Mg (Magnesium) in MgCl2 $\rightarrow$ Mg^{2+} (valency = 2)
Cs (Caesium) in CsCl $\rightarrow$ Cs^+ (valency = 1)

2. Which of the following is a binary compound?

A)NaCl B)Mg_3N_2 C)Al_2O_3 D)CaS.

Answer:A,B,C, D

Solution:
A binary compound consists of only two different elements.
NaCl (Sodium + Chlorine) $\rightarrow$ Binary
Mg_3N_2 (Magnesium + Nitrogen) $\rightarrow$ Binary
Al_2O_3 (Aluminium + Oxygen) $\rightarrow$ Binary
CaS (Calcium + Sulfur) $\rightarrow$ Binary

REASON AND ASSERTION TYPE

A) Both Assertion and Reason are true, and Reason is the correct explanation for Assertion.

B) Both Assertion and Reason are true, but Reason is NOT the correct expla nation for Assertion.

C) Assertion is true, but Reason is false.

D) Assertion is false, but Reason is true.

3. Assertion: The criss-cross method is a shortcut to determine the chemical formula without understanding the concept of ion charges.

Reason: While the criss-cross method simplifies the process of finding the chemical formula, a basic understanding of ion charges is essential to apply the method correctly.

Answer:D

Solution:Assertion (False): The criss-cross method requires knowledge of ion charges to work. It is not just a blind shortcut.

Reason (True): The method does simplify formula writing, but ion charges must be known (e.g., Na^+, Cl^-, SO_4^{2-}).

4. Assertion: The criss-cross method can be used to predict the formula of a compound formed between a metal and a polyatomic ion.

Reason: The criss-cross method is applicable to any combination of ions, including those involving polyatomic ions, to ensure charge balance in the compound.

Answer:A

Solution:Assertion (True): The method works for polyatomic ions (e.g., $Na^+ + SO_4^{2-} \rightarrow Na_2SO_4$).

Reason (True): It applies universally to balance charges, including polyatomic ions.

5. Assertion: The criss-cross method is particularly effective for binary ionic compounds.

Reason: Binary compounds, such as lithium fluoride (LiF), involve only two types of ions, simplifying the application of the criss-cross method.

Answer:A

Solution:Assertion (True): The method is most straightforward for binary compounds (e.g., $Mg^{2+} + O^{2-} \rightarrow MgO$).

Reason (True): Fewer ions mean easier charge balancing.

6. Assertion: The criss-cross method is a reliable technique for determining the formula of an ionic compound.

Reason: By exchanging the numerical charges of ions, the method provides a straightforward way to establish the correct ratio of ions in the compound.

Answer:A

Solution:Assertion (True): The method reliably gives correct formulas (e.g., $Al^{3+} + O^{2-} \rightarrow Al_2O_3$).

Reason (True): Swapping charges ensures charge neutrality.

7. Assertion : The criss-cross method ensures charge balance in the compound, as seen in the formation of aluminum sulfate ($Al_2(SO_4)_3$

Reason: The 3^+ charge on aluminum is criss-crossed with the 2^- charge on sulfate, resulting in the balanced formula $Al_2(SO_4)_3$

Answer:A

Solution:Assertion (True): The method guarantees charge balance ($Al_2(SO_4)_3$ is neutral).

Reason (True): The charges (3+ and 2-) are swapped to subscripts (2 and 3).

Reason correctly explains Assertion.

STATEMENT TYPE

A) Statement-I and Statement - II are True
B) Statement-I and Statement - II are False
C) Statement - I is True, Statement - II , is False
D) Statement - I is False, Statement - II is True

8. ***Statement I :*** The compound of magnesium and nitrogen is magnesium nitride.
Statement II :Potassium hypo chloride is KClO.

Answer:A

Solution:Statement I:True

Magnesium (Mg) has a valency of +2, and Nitrogen (N) has a valency of -3.
So the correct formula is Mg_3N_2, which is called magnesium nitride.
Statement II: True
"Hypo" indicates the lowest oxidation state of chlorine in oxyanions.
So, KClO is potassium hypochlorite

COMPREHENSION TYPE:

Comprehension-1:

Usaully the elements present in a compound are named in order of symbols appearing in formula.

9. The chemcial formula of Aluminium oxide is

A) Al_2O_3 B)$Al(OH)_2$ C) Al_3O_2 D) AlO_3

Answer:A

Solution:Aluminium (Al^{3+}) + Oxide (O^{2-})

Criss-cross method: Al_2O_3

10 . The chemical formula of magnesium nitride is

A) MgN_3 B) Mg_2N_3 C) Mg_3N_2 D) $MgNO_3$

Answer:C

Solution:Magnesium (Mg^{2+}) + Nitride (N^{3-})

Criss-cross method: Mg_3N_2

Comprehension-2

The representation of a molecule of a substance in terms of symbols & subscripts numbers is known as formule. The representation of a molecule of a substance (element or compoun4) in terms of symbols and subscript numbers is known as the formula.

11 Chemical formula for sodium sulphate is Na_2SO_4. The formula for trivalent metal sulphate will be:

A) $M_2(P_2O_7)_3$ B) $M_4P_3O_{14}$ C) $M_2(SO_4)_3$ D) M_3PO_4

Answer:C

Solution:For a trivalent metal (M^{3+}) with sulfate (SO_4^{2-}):

Using the criss-cross method: $M^{3+} + SO_4^{2-} \rightarrow M_2(SO_4)_3$

INTEGER TYPE:

12. How many molecules of magnesium chloride is formed when 1 volume of magnesium is react withh two volumes of hydrogen chloride

Answer:1

Solution:1 molecule of Mg reacts with 2 molecules of HCl $\rightarrow$ produces 1 molecule of $MgCl_2$

13. Number of hydrogen atoms present in Ammonia.....

Answer:3

Solution:NH_3 contains 3 hydrogen atoms.

14. Valency of calcium in calcium sulphate.....

Answer:2

Solution:Sulphate (SO_4^{2-}) has a 2- charge $\rightarrow$ Calcium must be Ca^{2+} (valency = 2).

15. Valency of iron in ferric chloride.....

Answer:3

Solution:$FeCl_3$: Chloride (Cl^-) has a 1- charge $\rightarrow$ Iron must be Fe^{3+} (valency = 3).

16. Valency of Aluminium in aluminium sulphate...

Answer:3

Solution:$Al_2(SO_4)_3$:

Sulphate (SO_4^{2-}) has a 2- charge $\rightarrow$ Aluminium must be Al^{3+} (valency = 3).

MATRIX MATCH TYPE:

17.

Column- I	**Column-II**
Compound Name	**Charges on Ions**
a. Sodium acetate	**1) +3, -3**
b. Phosphoric Acid	**2) +1,-1**
c. Aluminium Nitride	**3) +1,-3**
d. Calcium Carbide	**4) 2,-4**

Answer:a-1,b-2,c-3,d-4

Solution:

a. Sodium acetate	2) +1,-1
b. Phosphoric Acid	3) +1,-3
c. Aluminium Nitride	1) +3, -3
d. Calcium Carbide	4) 2,-4

KEY

				Teaching Task					
			JEE MAINS LEVEL QUESTIONS						
1	2	3	4	5	6	7	8	9	10
D	A	B	B	A	B	C	C	C	A
11	12	13							
A	C	D							
			JEE ADVANCED LEVEL QUESTIONS						
1	2	3	4	5	6	7	8	9	10
A,B	A,B,C,D	A	A	A	A	B	A	B	A
11	12	13	14		15				
C	B	D	a-5,b-1,c-2,d-3		a-4,b-1,c-3,d-2				
				Learners Task					
			CONCEPTUAL UNDERSTANDING QUESTIONS (CUQ's)						
1	2	3	4	5	6	7	8	9	10
D	B	A	C	C	C	B	A	A	A
11									
B									
			JEE MAINS LEVEL QUESTIONS						
1	2	3	4	5	6	7	8	9	10
B	A		C	A	C	B	B	A	B
11	12	13							
D	C	D							
			ADVANCED LEVEL QUESTIONS						
1	2	3	4	5	6	7	8	9	10
A,B,D	A,B,C,D	D	A	A	A	A	A	A	C
11	12	13	14	15	16	17			
C	1	3	2	3	3	a-1,b-2,c-3,d-4			