3.BASES / ALKALI - PREPARATIONS AND PROPERTIES SOLUTIONS

TEACHING TASK

JEE MAINS LEVEL QUESTIONS

1. Chemical name of bleaching powder is.

A)$CaCl_2$ B) NaCl C) Na_2CO_3 D) $CaOCl_2$

Answer:D

Solution: Chemical name of bleaching powder is $CaOCl_2$ (Calcium oxychloride)

2. $Ca(OH)_2 + Cl_2 \rightarrow ..... + H_2O$

A) $CaOCl_2$ B) CaCl2 C) CaO D) Ca

Answer:A

Solution:$a(OH)_2 + Cl_2 \rightarrow Ca(OH)_2 + H_2O$

3. An alkali solution having reletively less percentage of alkali in its aqeous solution is called

A) Dilute alkali B) Concentrated alkali C) both A & B D) None

Answer:A

Solution:Dilute alkali: Low concentration of OH^- ions (e.g., 0.1M NaOH).
Concentrated alkali: High OH^- concentration (e.g., 10M NaOH).

4. All properties of alkalis are due to the presence of the _____ formed on dissociation of the alkali in water

A) H^+ ions B) H_2O^+ ions C) H^+ ions D) OH^- ions

Answer:D

Solution:Alkalis dissociate in water to release hydroxide ions (OH^-), responsible for: Bitter taste,Slippery feel,Neutralizing acids.

5. What is the product formed when potassium oxide reacts with water?

A) NaOH B) Na_2O C) $Ca(OH)_2$ D) KOH

Answer:D

Solution:Reaction: $K_2O + H_2O \rightarrow 2KOH$

6. Which of the following are alkali substances

A) NaOH B) KOH C) $Al(OH)_3$ D) All

Answer:A,B

Solution:Alkalis: Water-soluble bases (NaOH, KOH, $Ca(OH)_2$).
C) $Al(OH)_3$: Insoluble in water $\rightarrow$ not an alkali.

7. From the following which is the mono basic acid

A) sulphuric acid B) acitic acid C) phosphoric acid D) all

Answer:B

Solution: Acetic acid (CH_3COOH)

Releases 1 H^+ ion per molecule: $CH_3COOH \rightleftarrows CH_3COO^- + H^+$

8. From the following which is the strong base.

A) $Ca(OH)_2$ B) KOH C) NH_4OH D) $Mg(OH)_2$

Answer:B

Solution:

Strong bases: Fully dissociate in water (NaOH, KOH, $Ca(OH)_2$).

Weak bases: Partial dissociation (NH_4OH, $Mg(OH)_2$).

JEE ADVANCED LEVEL QUESTIONS

Multi Correct Choice Type:

11. Which of the following is/are bases/s?

A) Magnesium oxide B) Copper oxide C) Aluminium hydroxide D) Sodium oxide

Answer:A,B,C,D

Solution:Metal oxides are bases

Statement Type:

12. Statement-I : All oxides and hydroxides of metals are bases.

Statement-II : The substances which react with acids to form salt and water as only products are called bases.

Answer:C

Solution:Statement-I (True):

Most metal oxides/hydroxides are basic (e.g., NaOH, CaO).

Exception: Some are amphoteric (e.g., Al_2O_3, ZnO).

Statement-II (False):

Bases react with acids to form salt + water, but this is not the only definition.

Arrhenius bases produce OH^- ions in water.

Lewis bases donate electron pairs.

13. Statement-I : The oxides and hydroxides of sodium and potassium are strong bases.

Statement-II : Sodium hydroxide and potassium hydroxide are not soluble in water

Answer:C

Solution:Statement-I (True):NaOH and KOH are strong bases (fully dissociate in water)

Statement-II (False):NaOH and KOH are highly soluble in water (form alkaline solutions).

Comprehension type

14. Ammonia liquor is

A) Ammonia chloride B) Ammonium bicarbonate

C) Ammonium carbonate D) Ammonium hydroxide

Answer:D

Solution:Ammonia liquor (also called aqueous ammonia) is a solution of ammonia gas (NH_3) dissolved in water, forming ammonium hydroxide (NH_4OH)

15. What is the product formed when potassium oxide racts with water?

A) KOH B) K_2O C) $Ca(OH)_2$ D) $Ca(OH)_3$

Answer:A

Solution:Reaction: $K_2O+H_2O \rightarrow 2KOH$

Integer Type :

16. The number of Hydroxyl ions (OH^-) furnished by ..... molecule of an Akali on complete dissociation in water.

Answer:1

Solution:Alkalis (e.g., NaOH, KOH) dissociate fully in water to release 1 OH^- ion per molecule:

17. Alkalies classified into ..... types based on strength.

Answer:2

Solution:Alkalis are categorized into two types based on their dissociation strength:
Strong alkalis: Fully dissociate in water (e.g., NaOH, KOH).
Weak alkalis: Partially dissociate (e.g., NH_4OH, $Ca(OH)_2$).

Matrix Matching Type :

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

Solution:

Column-I	Column-II
a) KOH	1) Monoacidic base 2) Strongalkali
b) NH_4OH	4) Weak alkali
c) NaOH	1) Monoacidic base2) Strongalkali
d) $Ca(OH)_2$	3) Diacidic base

LEARNERS TASK

CONCEPTUAL UNDERSTANDING QUESTIONS

1. NaoH is an example for

A) Strong Base B) Mono acidic alkali C) Weak acid D) A and B only.

Answer:D

Solution:Strong Base: Fully dissociates in water ($NaOH \rightarrow Na^{+} + OH^{-}$).

Mono acidic alkali: Releases 1 OH^{-} ion per molecule.

2. Which of the following is used as 'antacid'

A) Calcium hydroxide B) Magnesium hydroxide C) Sodium hydroxide D) None

Answer:B

Soluion: Magnesium hydroxide ($Mg(OH)_2$) Neutralizes stomach acid (HCl) without side effects.

3. Formula of slaked lime

A)$Mg(OH)_2$ B) $Ca(OH)_2$ C) NaOH D) CaO.

Answer:B

Solution:Prepared by adding water to quicklime (CaO):$CaO+H_2O \rightarrow Ca(OH)_2$

4. The Number of hydroxyl ions (OH^{-}) furnished by one molecule of an alkali is called as

A) acidity B) Basicity C) Atomcity D) None

Answer:A

Solution:The number of hydroxyl ions produced by one molecule of an alkali on complete dissociation is called as acidity of Bases.

5. Which of the following are correct statements

A) Bases conduct electricity in solution B) Alkalis bitter in taste

C) Bases Turns red litmus blue D) All the above.

Answer:D

Solution:Conduct electricity (due to OH^{-} ions),Bitter taste,Turn red litmus $\rightarrow$blue.

6. Choose the false statements:

A) Na_2O is a common base. B) NaOH is a common base.

C) CuO is a common alkali. D) $Al(OH)_3$ is a common alkali.

Answer:C,D

Solution:Alkalis are water-soluble bases (NaOH, KOH).

CuO: Insoluble → not an alkali.

$Al(OH)_3$: Amphoteric (acts as acid/base) but not a common alkali.

7. Acid used in the stain remover ?

A) Oxalic acid B) Boric acid C) Phosphoric acid D) Sulphuric acid

Answer:A

Solution:Oxalic acid ($H_2C_2O_4$)-Removes rust/ink stains by chelating metal ions.

8. LiOH is a

A) Mono basic B) Dibasic C) Tribasic D) None

Answer:A

Solution:Releases 1 OH^- ion:$LiOH \rightarrow Li^+ + OH^-$

9. Which of the following is strong Alkali ?

A) KOH B) NH_4OH C) $Ca(OH)_2$ D) $Mg(OH)_2$

Answer:A

Solution:Group 1 hydroxides (NaOH, KOH) are strong alkalis (100% dissociation).

Others: NH_4OH (weak), $Ca(OH)_2$/$Mg(OH)_2$ (partially soluble).

10. $3\ Fe + H_2O\ (steam) \rightarrow ? + H_2$

A) FeO B) Fe_2O_3 C) Fe_3O_4 D) Fe

Answer:C

Solution: $3\ Fe + H_2O\ (steam) \rightarrow Fe_3O_4 + 4H_2$

JEE MAIN LEVEL QUESTIONS

1. Acid is used in the washing eyes ?

A) Oxalic acid B) Citric acid C) Acetic acid D) Boric acid

Answer:D

Solution: Boric acid (H_3BO_3)- Mild antiseptic; used in dilute solution for eye washes.

2. Acid used in the De-scaling process ?

A) dil. HCl B) dil.H_2SO_4 C) H_2CO_3 D) HNO_3

Answer:A

Solution:Dil. HCl: Removes limescale ($CaCO_3$) by reacting to form soluble $CaCl_2$

$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$

3. An Alkali solution having a relatively high percentage of alkali in its aqueous solution is called

A) Strong alkali B) Weak alkali C) Concentrated alkali D) Dilute alkali

Answer:C

Solution: Alkali solution with high percentage of alkali is called Concentrated alkali.

4. Which of the following is a Triacidic Base ?

A) $Fe(OH)_3$ B) $Cu(OH)_2$ C) H_3PO_4 D) H_2SO_4

Answer:A
Solution:A) $Fe(OH)_3$Releases 3 OH^- ions
5. $4K+O_2 \rightarrow$ .....
A) K_2O B) $2K_2O$ C) $3K_2O$ D) 2KO
Answer:B
Solution: $4K+O_2 \rightarrow 2K_2O$
6. Ammonia gas dissolved in water produces
A) NH_4 B) NH_4OH C) NH_3 D) $NH_4(OH)_2$
Answer:B
Solution:$NH_3 + H_2O \rightarrow NH_4OH$
7. Metal carbonates on strong heating produces
A) H_2 Gas B) CO_2Gas C) CO Gas D) N_2Gas
Answer:B
Solution:$CaCO_3 \rightarrow CaO+CO_2$
8. $2K_2O + H_2O \rightarrow ?$
A) KOH B) K_2O C) $K+O_2$ D) $K(OH)_2$
Answer:A
Solution: $2K_2O + 2H_2O \rightarrow 4KOH$
9. Which of the following metals produces hydrogen gas on steam ?
A) Na B) Ca C) Mg D) Cu
Answer:C
Solution:Reaction:
$Mg+H_2O$ (steam) $\rightarrow MgO+H_2$
Others:Na/Ca react violently with cold water.
Cu does not react.
10. All metal oxides are
A) Alkalies B) Bases C) Acids D) Salts
Answer:B
Solution: All metal oxides are Bases.

JEE ADVANCED LEVEL QUESTIONS

Multi Correct Answer Type

11. Which of the following is a Diacidic Alkali/Base
A) $Ca(OH)_2$ B) $Mg(OH_{)2}$ C) $Cu(OH)_2$ D) $Fe(OH)_3$
Answer:A,B,C
Solution:Diacidic bases release 2 OH? ions per molecule in water
12. Sulphuric acid used in the
A) Used in the batteries B) Used in the fertilizers
C) Used in the dyesD) Used in the De - scaling
Answer:A,B,C

Solution: Sulphuric acid (H_2SO_4) is used in:
A) Used in the batteries (Lead-acid batteries)
B) Used in the fertilizers (Production of superphosphates, ammonium sulfate)
C) Used in the dyes (As a catalyst or reactant in dye synthesis)

Statement Type:

13. Statement -I : The oxides and hydroxides of all metals are weak bases.
Statement -II : Ammonium hydroxide obtained by dissolving ammonia gas in water is a weak base.

Answer:D

Solution:Statement-I (False):
Not all metal oxides/hydroxides are weak bases. Examples:
Strong bases: NaOH, KOH (Group 1 hydroxides).
Weak bases: NH_4OH, $Cu(OH)_2$.
Statement-II (True):
NH_4OH is a weak base (partial dissociation)

14. Statement -I : The oxides of metals are commonly called basic oxides.
Statement -II : The basic oxides react with acids to form salt and water as only products.

Answer:A

Solution:Statement-I (True):
Metal oxides (e.g., Na_2O, CaO) are basic oxides (they neutralize acids).
Statement-II (True & Explanatory):
Basic oxides react with acids:$Na_2O+2HCl \rightarrow 2NaCl+H_2O$
This property defines basic oxides.

Comprehension type :

15. Carbonate metal which will not decompose on strong heating also.
A) K_2CO_3 B) $CaCO_3$ C) $ZnCO_3$ D) $CuCO_3$

Answer:A

Solution:Group 1 carbonates (K_2CO_3, Na_2CO_3) are thermally stable and do not decompose on heating.

16. $ZnCO_3 \xrightarrow{heat} ?+?$
A) ZnO, CO_2 B) Zn,CO_2 C) $ZnCO_2$,O_2 D) Zn,O_2

Answer:A

Solution:Zinc carbonate decomposes on heating
$ZnCO_3 \xrightarrow{heat} ZnO+ CO_2$

Integer Type :

17. Di acidic base contain ..... number of Hydroxyl ions to react with one molecule acid.

Answer:2

Solution:Diacidic bases: 2 OH^- ions

18. ..... $Na + 2H_2O \rightarrow 2NaOH + H_2$

Answer:2

Solution: $2Na + 2H_2O \rightarrow 2NaOH + H_2$

Matrix Matching Type :

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

Solution:

Column-I	Column-II
a) $4Na + O_2$	3) $2Na_2O$
b) $2Mg + O_2$	4) $2MgO$
c) $Na_2O + H_2O$	1) $2NaOH$
d) $K_2O + H_2O$	2) 2 KOH

KEY

		TEACHING TASK							
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1	2	3	4	5	6	7	8		
D	A	A	D	D	A,B	B	B		
11	12	13	14	15	16	17	18		
A,BC,D	C	C	D	A	1	2	a-1,2,b-4,c-1,2,d-3		
		LEARNERS TASK							
		CONCEPTUAL UNDERSTANDING QUESTIONS							
1	2	3	4	5	6	7	8	9	10
D	B	B	A	D	C,D	A	A	A	C
		JEE MAIN LEVEL QUESTIONS							
1	2	3	4	5	6	7	8	9	10
D	A	C	A	B	B	B	A	C	B
		JEE ADVANCED LEVEL QUESTIONS							
11	12	13	14	15	16	17	18	19	
A,B,C	A,B,C	D	A	A	A	2	2	a-3,b-4,c-1,d-2	

WORKSHEET BASED ALKALI / BASE PROPERTIES & USES

TEACHING TASK

JEE MAIN LEVEL QUESTIONS

1. $2NaOH + Zn \rightarrow ? + H$.

A) $Zn(OH)_2$ B)NaO C) Na_2ZnO_2 D)none

Answer:C

Solution: $2NaOH + Zn \rightarrow ? + H$.

2. Calcium hydroxide is used in the manfacture of .

A)plaster of paries B)bleaching powder C)soap D)synthetic fibre

Answer:A

Solution:Calcium hydroxide is used in the manfacture of plaster of paries.

3. Bases are

A) Good conductors of electricity B) Bad conductors of electricity

C) Neutral D) Bad conductors of heat

Answer:A

Solution:Bases are Good conductors of electricity because they release OH^- ions in water.

4. Bases turns red litms to

A) Red B) Blue C) Pink D) Yellow

Answer:B

Solution:Bases turns red litms to Blue

5. Alkalies are

A) Sour taste B) Bitter taste C) Sweet taste D) Spicy taste

Answer:B

Solution:Alkalies are Bitter taste .

6. Bases reacts with acids to form

A) Salts B) Oxides C) Hydroxides D) Non-metallic oxides

Answer:A

Solution: Bases reacts with acids to form salt and water.

7. Slaked lime is a

A) Calcium Hydroxide B) Potassium Hydroxide

C) Sodium Hydroxide D) Lithium Hydroxide

Answer:A

Solution:Slaked lime is called as Calcium Hydroxide ($Ca(OH)_2$).

8. A Base used in the synthesis of Rayan ?

A) KOH B) NaOH C) $Ca(OH)_2$ D) $Mg(OH)_2$

Answer:B

Solution:NaOH is used in the synthesis of Rayan

9. $KOH + CO_2 \rightarrow ?$

A) $K_2CO_3+H_2O$ B) $K_2O+C_2O+H_2O$ C) KO_2+H_2O D) $K_2CO_3+H_2O+CO_2$

Answer:A

Solution:$2KOH + CO_2 \rightarrow K_2CO_3+H_2O$

10. When alkalis are warmed with Ammonium salts, they liberated .....

A) H_2Gas B) CO_2Gas C) NH_3Gas D) NH_4Gas

Answer:C

Solution:Ammonia gas is evolved when alkali is added to an ammonium salt

$NH_4Cl + NaOH \rightarrow NaCl + H_2O + NH_3$

JEE ADVANCED LEVEL QUESTIONS

Multi Correct Choice Type:

11. NaOH used in the

A) Manufacture of soap

B) Manufacture of paper

C) Manufacture of Bleaching powder

D) Cure indigestion

Answer:A,B

Solution:NaOH used in the Manufacture of soap and paper.

Statement Type:

12. Statement-I : Magnesium Hydroxide is used an antacid

Statement-II : It cures indigestion by neutralising excess acid in the stomach

Answer:A

Solution:Antacid is used to cure indigestion which is prepared by using indigestion

Comprehension type

13. Caustic soda is

A) NaOH B) KOH C) NH_4OH D) $Ca(OH)_2$

Answer:A

Solution:NaOH is commonly called as Caustic soda.

14. Caustic soda used in

A) Used to make soap B) Used to make paper

C) Drain pipe cleaner D) All

Answer:D

Solution: Caustic soda used to make soap ,paper, Drain pipe cleaner

Matrix Matching Type :

15. **Answer:a-C,b-B,c-D,d-A**

Solution:

a) Slaked line C) Ca(OH)2
b) Baking soda B) NaHCO3
c) Washing soda D) Na2CO3
d) Milk of magnesia A) Mg(OH)2

LEARNERS TASK

JEE MAIN LEVEL QUESTIONS

1. $2\ Al(OH)_3 \xrightarrow{\Delta}$

A) Al_2O3+H_2O B) Al_2+O_2 C) AlO_3+H_2O D) $AlO+O_2$

Answer:A

Solution:$2\ Al(OH)_3 \xrightarrow{\Delta} Al_2O3+H_2O$

2. $NaOH + CO_2 \rightarrow$

A) Carbonate B) Bicarbonate C) Oxide D) none

Answer:A

Solution:$2NaOH + CO_2 \rightarrow Na_2CO_3$ (Carbonate)$+H_2O$

3. Bleaching powder prepared from

A) $Ca(OH)_2$ B) NaOH C) KOH D) NH_4OH

Answer:A

Solution:$CaOHClCaOCl$

4. Acids reacts bases forms

A) Salts B) Carbonates C) Oxides D) Hydroxides

Answer:A

Solution:Acids reacts bases forms salt and water

5. Bases in methyl orange solution turns

A) Brown B) Yellow C) Pink D) Blue

Answer:B

Solution:Bases in methyl orange solution turns Yellow

6.$Al(OH)_3 + H_2SO_4 \rightarrow$

A) $Al_2(SO_4)_3+H_2O$ B) $Al_3(SO_D)_2+H_2O$ C) $Al_2O_3+H_2O$ D) $AlO+H_2O$

Answer:A

Solution:$2Al(OH)_3 + 3H_2SO_4 \rightarrow Al_2(SO_4)_3+6H_2O$

7. Sodium carbonate used in the

A) Softening hard water B) hardering water

C) Antacid D) Soap manufacture

Answer:A

Solution:Sodium carbonate used in Softening hard water .

8. $Ca(OH)_2 \xrightarrow{\Delta}$
A) $CaO+H_2O$ B) $Ca+H_2O$ C) $CaOH+O_2$ D) CaO_2+H_2O
Answer:A
Solution:$Ca(OH)_2 \xrightarrow{\Delta} CaO+H_2O$
9. Baking soda used in the
A) Antacid B) Rayon preparationC) Cure indigestion D) Cooking
Answer:D
Solution:Baking soda used in the Cooking
10. Bases in prenolphthalin solution
A) Yellow B) Pink C) Brown D) Red
Answer:B
Solution:Bases in prenolphthalin solution is Pink

JEE ADVANCED LEVEL QUESTIONS

Multi Correct Answer Type
11. Bases which will not decompose on strong heating also
A) NaOH B) KOH C) $Ca(OH)_2$ D) $Al(OH)_3$
Answer:A,B
Solution:NaOH,KOH are not decompose on strong heating because Na,K are highly reactive metals that make stable bonds,which make it resistant to decompose on heating.
Statement Type:
12. Statement-I : All bases decompose on heating to form their oxides and water.
Statement-II :$Ca(OH)_2 \xrightarrow{\Delta} CaO+H_2O$
Answer:D
Solution:Statement-I is false (not all bases decompose like this).
Statement-II is true $Ca(OH)_2$ does decompose as stated)
Comprehension type :
Potassium hydroxide is an base with the formula KOH and commonly called caustic potash.
13. The compound which is colourless and odourless in its solid state ?
A) KOH B) NaOH C) NH_4OH D) None
Answer:A
Solution:KOH is colourless and odourless in its solid state
14. Which of the following is used to study the identifying colors of mushrooms ?
A) NaOH B) NH_4OH C) Ca(OH)2 D) KOH

Answer:D

Solution:KOH is used to study the identifying colors of mushrooms

Matrix Matching Type :

15. **Answer:a-B,b-C.c-A,d-D**

Solution:

Column-I	Column-II
a) Acid + Base	B) Salt + H_2O
b) KOH on heat	C) No reaction
c) Ammonium salt	A) NH_3 Gas
d) KOH + CO_2	D) K_2CO_3 + H_2O

KEY

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				JEE MAIN LEVEL QUESTIONS					
1	2	3	4	5	6	7	8	9	10
C	A	A	B	B	A	A	B	A	C
				JEE ADVANCED LEVEL QUESTIONS					
11	12	13	14	15					
A,B	A	A	D	a-C,b-B,c-D,d-A					
				LEARNERS TASK					
				JEE MAIN LEVEL QUESTIONS					
1	2	3	4	5	6	7	8	9	10
A	A	A	A	B	A	A	A	D	B
				JEE ADVANCED LEVEL QUESTIONS					
11	12	13	14	15					
A,B	D	A	D	a-B,b-C,c-A,d-D					