

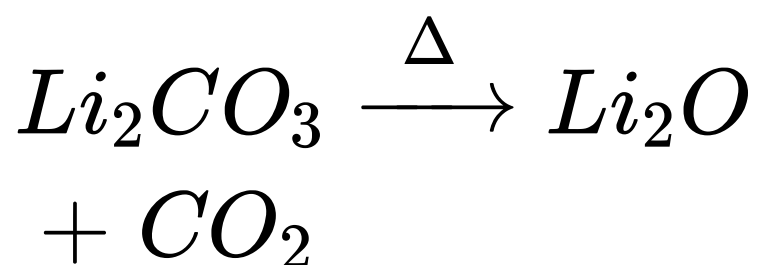
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Q-1 - 11468462

How many moles of CO_2 will be formed when a mixture containing 10 moles each of Li_2CO_3 and Na_2CO_3 are heated ?

SOLUTION:

On heating, Li_2CO_3 decomposes to give Li_2O and CO_2 whereas K_2CO_3 do not decompose.



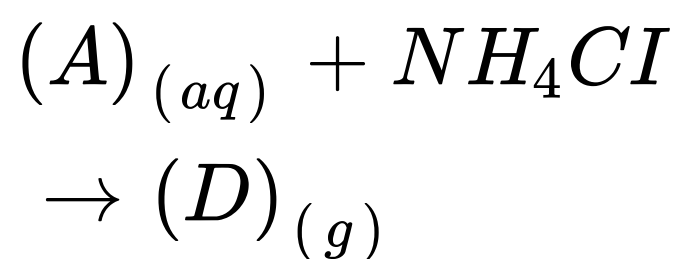
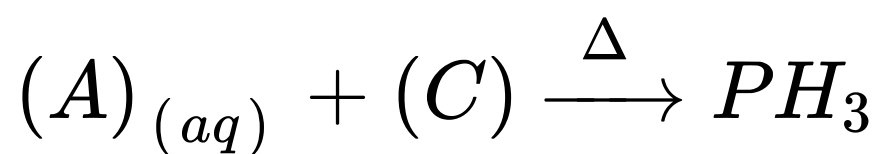
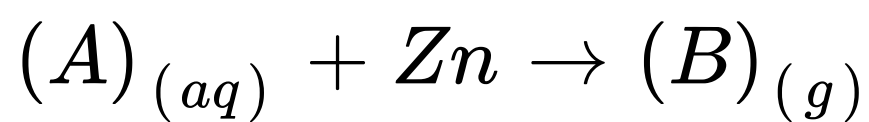
Since one mole of Li_2CO_3 decomposes to give one mole of CO_2 , 10 moles of CO_2 will be formed on heating a mixture containing 10 moles each of Li_2CO_3

and Na_2CO_3 .

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Q-2 - 11468467

Identify (A), (B), (C) and (D) and give their formula:

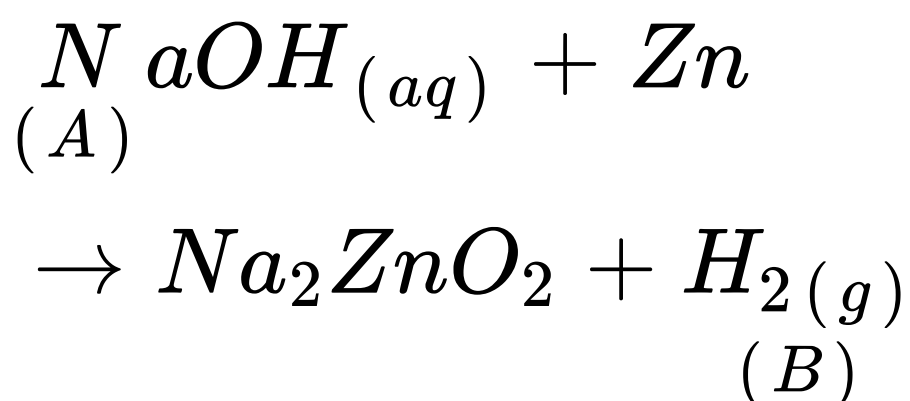


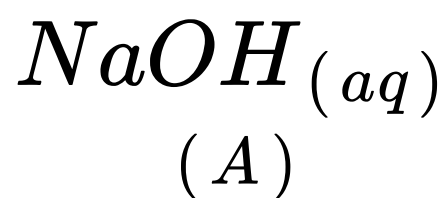
Compound (A) imparts golden yellow colour to the Bunsen flame.

SOLUTION:

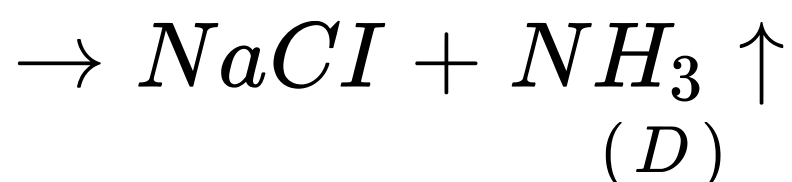
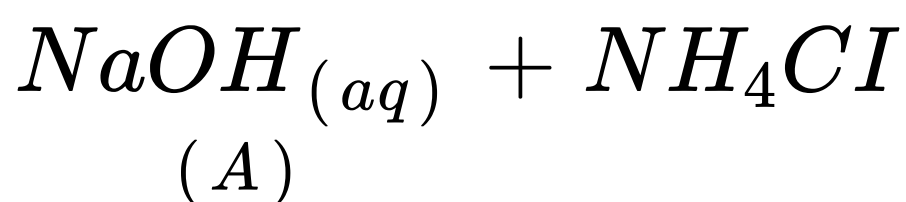
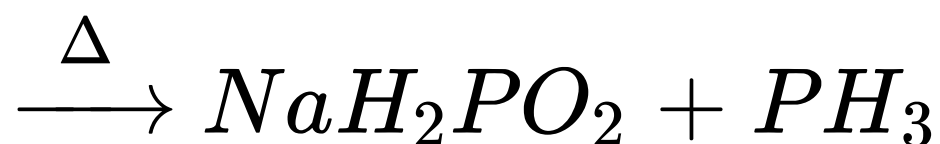
Compound (A) imparts golden yellow colour to the

Bunsen flame, it seems (A) is NaOH.





White phosphorous



Hence, (A) is sodium ($NaOH$) hydroxide, (B) is hydrogen gas (H_2), (C) is white phosphorous (P_4) and (D) is ammonia gas (NH_3).

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A ceratin compound (A) imperts a golden yellow flame and exhibits following reactions:

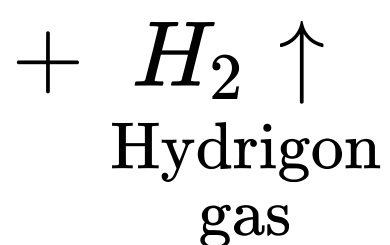
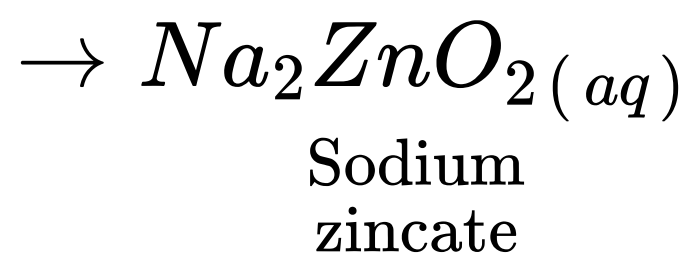
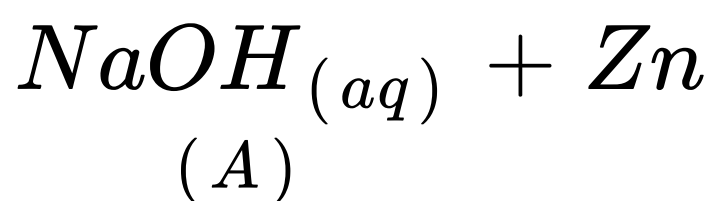
a. When a concentrated solution of (A) is boiled with Zn power, hydrogen gas is evolved.

b. When an aqueous solution of (A) is added to an precipitate is obtained, which dissolves in excess of solution (A).

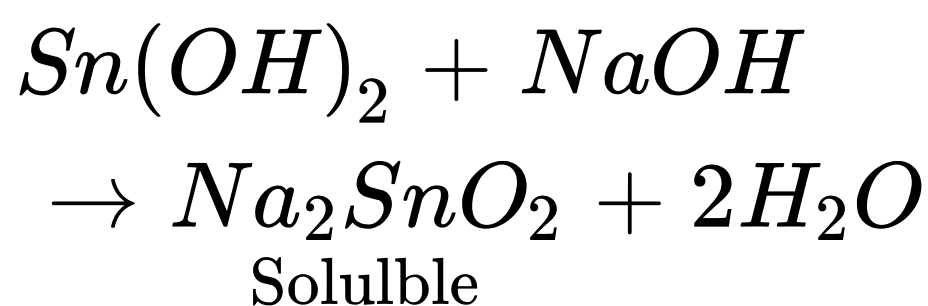
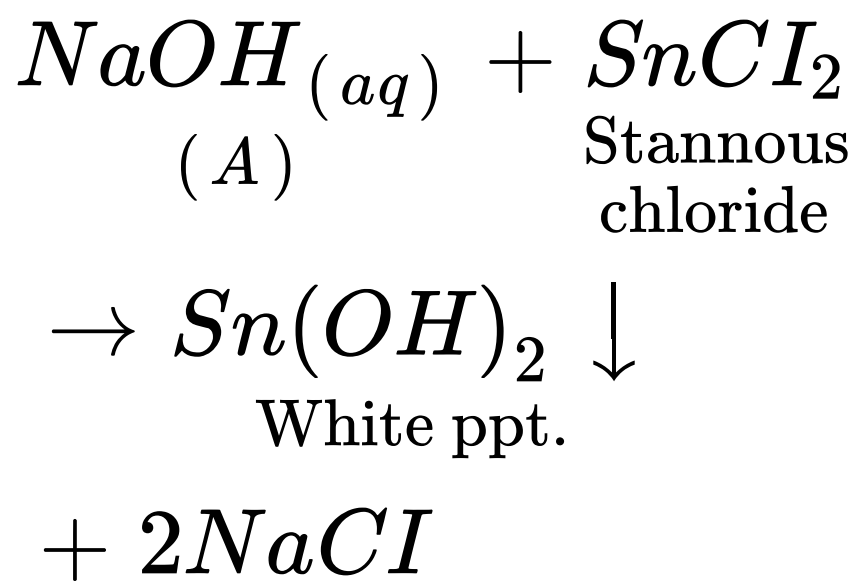
Identify (A) and give equations for reactions in (ii).

SOLUTION:

a.



b.



Hence, (A) is NaOH and imparts golden yellow colour to the flame.

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Q-4 - 11468469

An inorganic compound (A) loses its water of crystallisation on heating and its aqueous solution gives the following reactions:

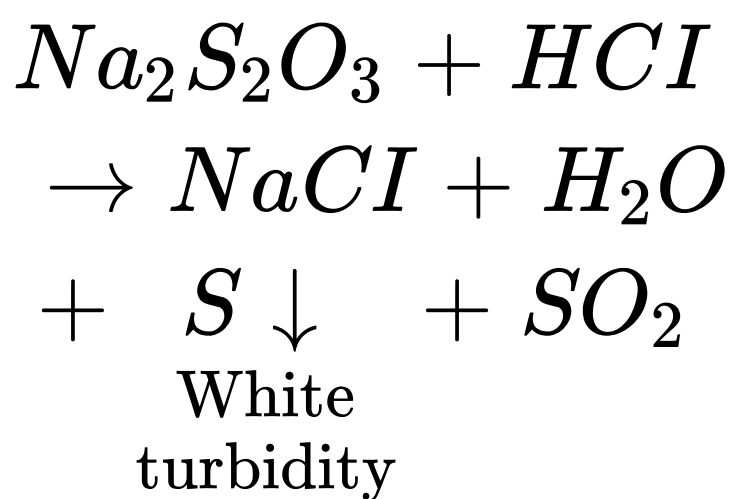
- It gives a white turbidity with dil HCl.
- It decolourises a solution of iodine in KI.

c. It gives a white ppt. with $AgNO_3$ solution, which turns black on standing.

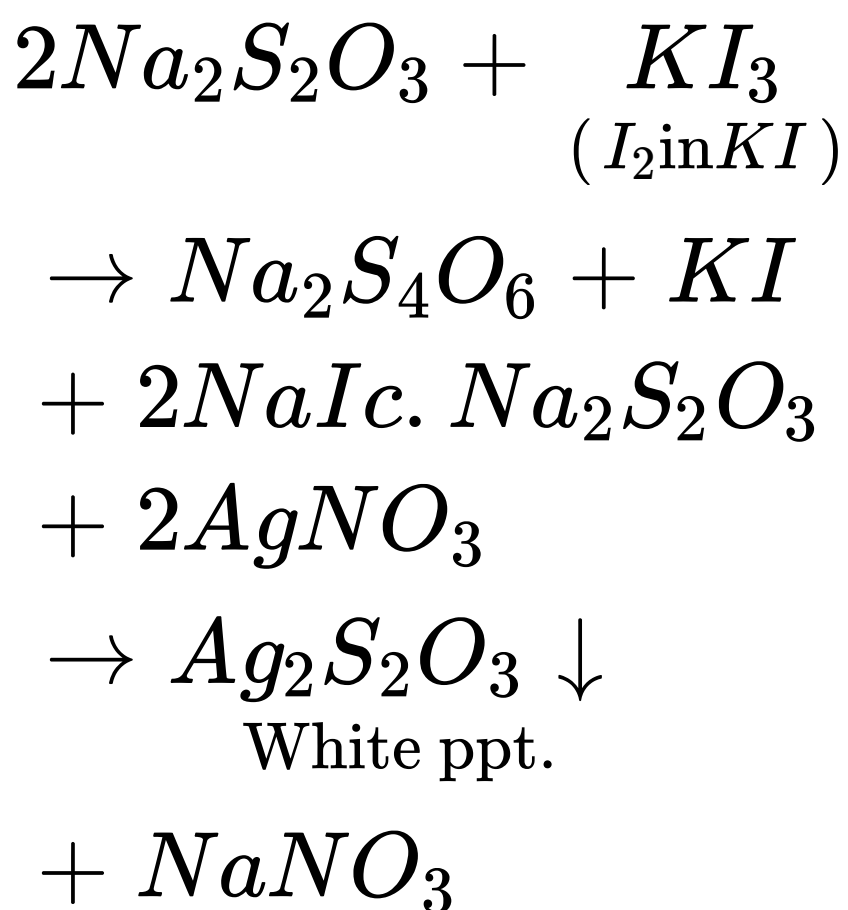
SOLUTION:

(A) is sodium thiosulphate, $Na_2S_2O_3 \cdot 5H_2O$.

a.



b.



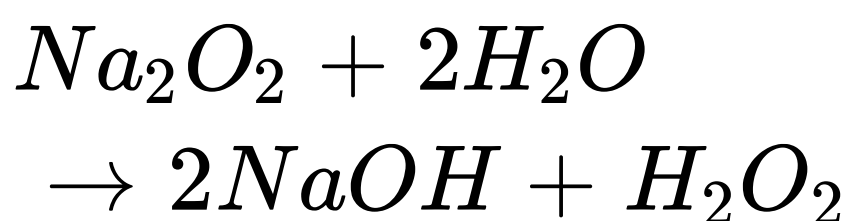
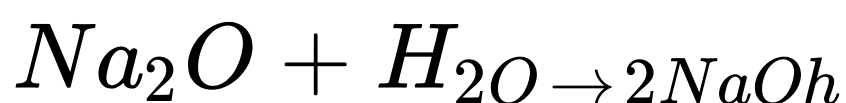
A white solid (A) is either Na_2O or Na_2O_2 .

a. A piece of red litmus paper turns white when it is dipped into a freshly made aqueous solution of the white solid.

b. Explain what would happen to the red litmus if the white solid were the other compound.

SOLUTION:

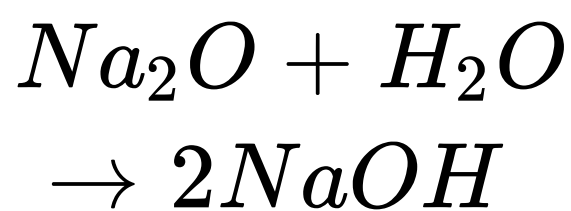
a. Na_2O and Na_2O_2 , when dissolved in water give



A piece of litmus paper turns white when it is dipped into a freshly made aqueous solution of compound (A), due to bleaching action of H_2O_2 , thus compound (A) is Na_2O_2

, i.e., sodium peroxide.

b. If white solid was Na_2O , the red litmus paper will turn blue due to the strong alkaline nature of the solution.

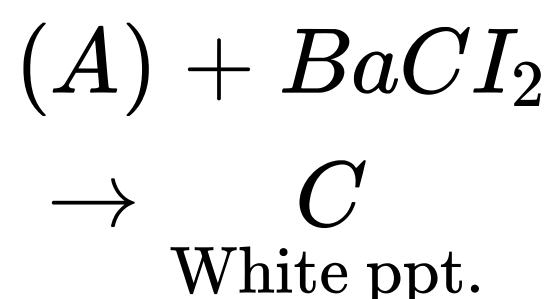
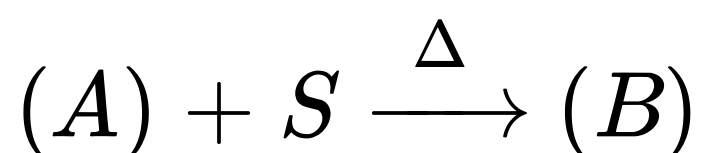


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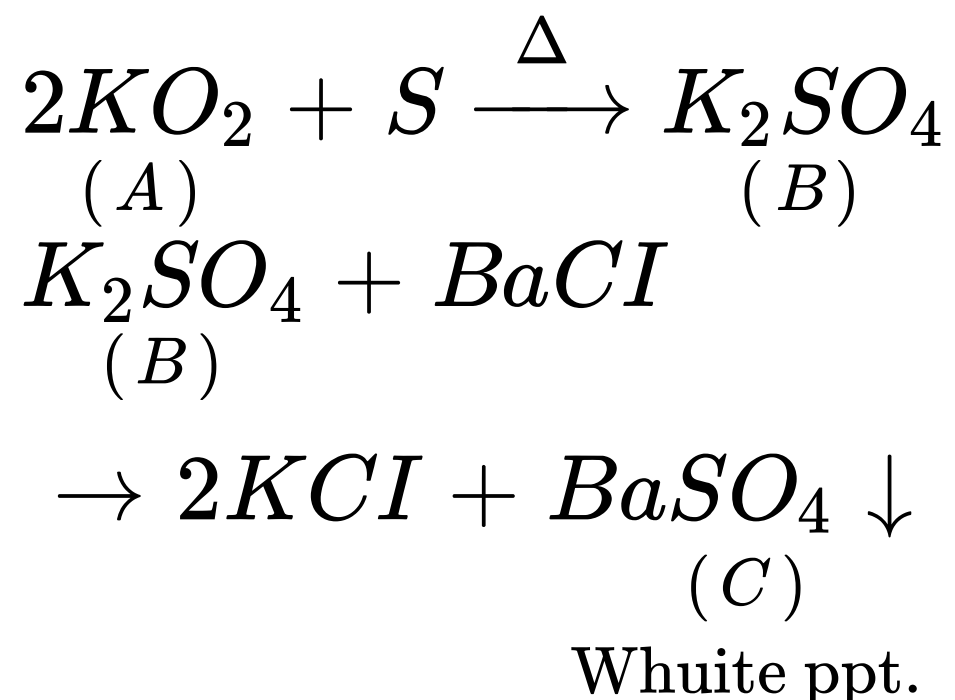
Q-6 - 11468472

A binary of potassium (A) on heating with sulphur, compound (B) is formed. (B) on reacting with $BaCl_2$ gives a white precipitate (C) which is insoluble in concentrated HCl. Identify (A), (B) and (C).

SOLUTION:



(A) is binary salt of potassium. (C) is white ppt. which is insoluble in conc HCl.



Hence, (A) is K_2O_2 (potassium peroxide), (B) is K_2SO_4 (potassium sulphate) and (C) is $BaSO_4$ (barium sulphate).

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Q-7 - 11468549

Which of the following compounds decompose on heating ?

(A) CsOH

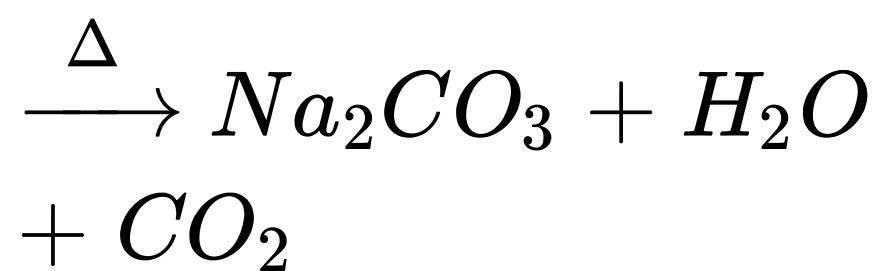
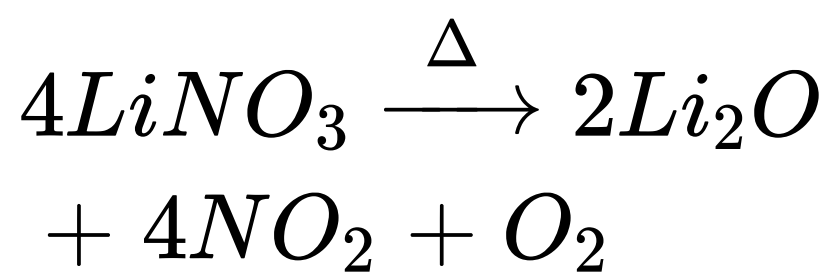
(B) KOH

(C) LiNO_3

(D) NaHCO_3

CORRECT ANSWER: C::D

SOLUTION:



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Which of the following compounds is/are not soluble in water ?

(A) NaCl

(B) LiF

(C) Li_2CO_3

(D) Na_2CO_3

CORRECT ANSWER: B::C

SOLUTION:

LiF and Li_2CO_3 being covalent are not soluble in water.

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Q-9 - 11478856

Carnallite is an ore of

(A) Sodium

(B) Potassium

(C) Magnesium

(D) Aluminium

CORRECT ANSWER: B::C

SOLUTION:

Carnallite is $KCl \cdot MgCl_2 \cdot 6H_2O$.

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Q-10 - 11468558

When a mixture of Li_2CO_3 and $Na_2CO_3 \cdot 10H_2O$ is heated strongly, there occurs a loss of mass due to

(A) Decomposition of Li_2CO_3

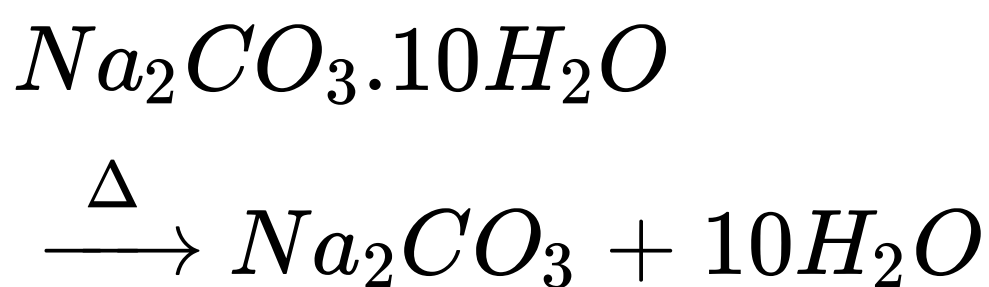
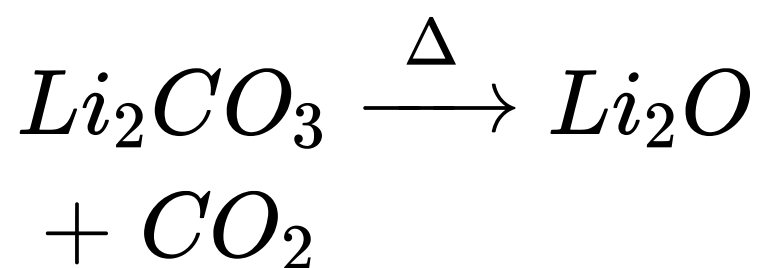
(B) Loss of water by $Na_2CO_3 \cdot 10H_2O$

(C) Decomposition of $Na_2CO_3 \cdot 10H_2O$

(D) None of the above.

CORRECT ANSWER: A::B

SOLUTION:



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Q-11 - 16017688

The pair of compounds which cannot exist together in aqueous solution is:

(I) NaH_2PO_4 and NaHCO_3 (II) Na_2CO_3 and NaHCO_3

(III) NaOH and NaH_2PO_2 (IV) NaHCO_3 and NaOH

(A) *I, II, III*

(B) *II, III*

(C) *I, IV*

(D) only *IV*

CORRECT ANSWER: D

SOLUTION:

Acidic salt NaHCO_3 and NaOH (base) react with each other so they cannot exist together in aqueous solution.

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A highly pure dilute solution of sodium in liquid ammonia:

- (A) Shows blue colour
 - (B) Exhibits electrical conductivity
 - (C) Produces sodium amide
 - (D) Produces hydrogen gas
-

CORRECT ANSWER: A::B

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Q-13 - 11468568

The compounds(s) formed upon combustion of sodium metal excess air is/are

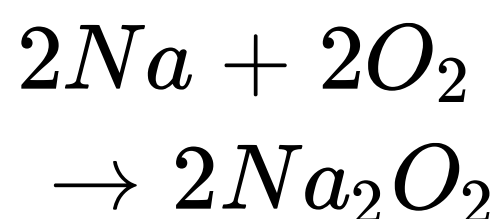
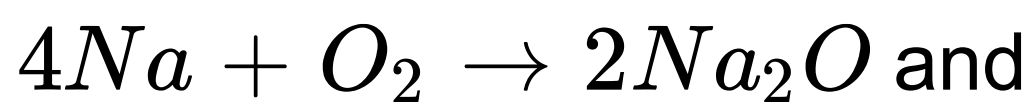
- (A) Na_2O_2
- (B) Na_2O

(C) NaO_2

(D) NaOH

CORRECT ANSWER: A::B

SOLUTION:



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Q-14 - 11468577

Which of the following is/are found in the solid state ?

(A) $LiHCO_3$

(B) $KHCO_3$

(C) $NaHCO_3$

(D) NH_4HCO_3

CORRECT ANSWER: B::C::D

SOLUTION:

All are soluble in water.

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Q-15 - 20006775

The alkaline earth metals, which do not impart any colour to

Bunsen flame are :

(A) Be and Mg

(B) Mg and Ca

(C) Be and Ca

(D) Be and Ba

CORRECT ANSWER: A

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Q-16 - 12975967

All the alkali metals and their salts (particularly chlorides due to their more volatile nature) impart a characteristic color to the oxidizing flame of Bunsen burner. Which of the following imparts yellow color in a flame test?

(A) Li

(B) K

(C) Na

(D) Cs

CORRECT ANSWER: C

SOLUTION:

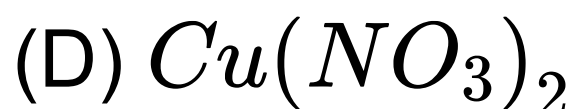
To perform the flame test, a sample of the metal chloride or any salt of the metal moistened with conc. HCl is heated on a Pt or nichrome wire in a Bunsen burner flame. The heat from the burner excites one of the orbital electrons to a higher level. When the excited e^- drops back to its original energy level, it gives out the extra energy it obtained. For alkali metals, the energy emitted appears as visible light thus, giving the characteristic flame colorations.

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Q-17 - 11468582

Nitrogen dioxide cannot be obtained by heating

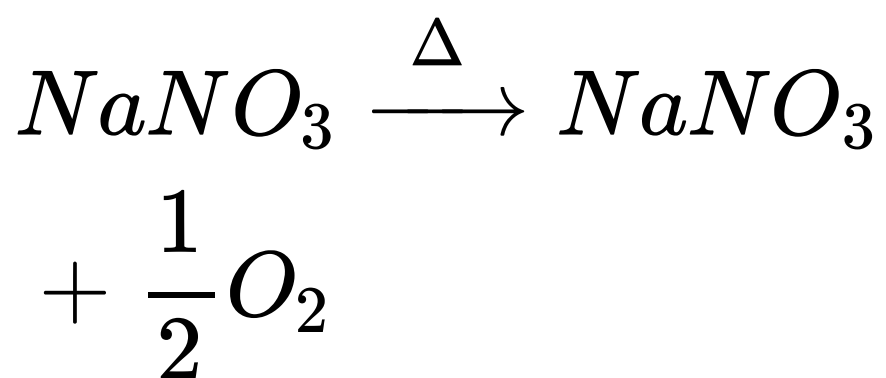
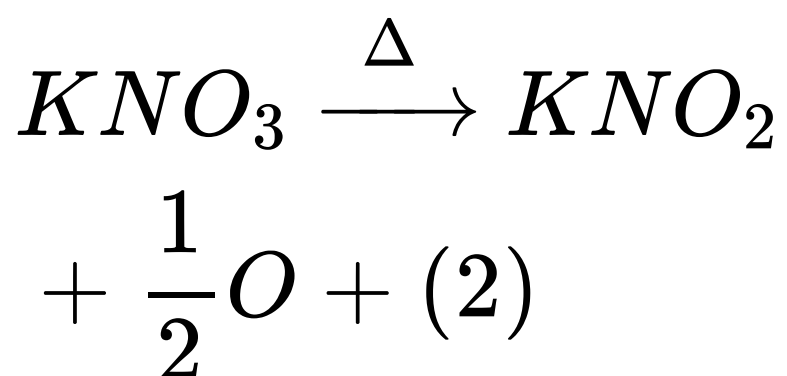




CORRECT ANSWER: A::B

SOLUTION:

They decompose on heating to give nitrite and O_2 .



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Q-18 - 11468587

Alkali metals can be extracted from their salts by

- (A) Reduction with carbon
 - (B) Electrolysis of fused halides
 - (C) Electrolysis of used halides
 - (D) Reduction with aluminum
-

CORRECT ANSWER: C

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Q-19 - 12975969

Which of the following alkali metals is frequently used as a cathode in the photoelectric cells ?

- (A) Cs
- (B) K
- (C) Na

(D) Li

CORRECT ANSWER: A

SOLUTION:

Except Li, all alkali metals exhibit photoelectric effects, i.e., emit electrons from the surface on exposure to visible light. This is on account of their low ionization enthalpy, fails to do so. Because of the lowest ionization enthalpy, Cs is frequently used in solar cells.

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Q-20 - 12675911

Which one is the highest melting halide ?

(A) NaCl

(B) NaBr

(C) NaF

(D) NaI

CORRECT ANSWER: C

SOLUTION:

NaF is the structure ionic crystal so its melting point would be highest

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Q-21 - 16017620

Which is an ore of potassium

(A) Carnallite

(B) Cryolite

(C) Bauxite

(D) Dolomite

CORRECT ANSWER: A

SOLUTION:

Carnallite
– $KCl, MgCl_2, 6H_2O$

Cryolite – Na_3AlF_6

Bauxite
– $(Al_2O_3 \cdot 2H_2O)$

Dolomite – $MgCO_3$
 $\cdot CaCO_3$

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Q-22 - 14157111

$Na_2SO_4 \cdot xH_2O$ has 50 % H_2O . Hence, x is :

(A) 4

(B) 5

(C) 6

(D) 8

CORRECT ANSWER: D

SOLUTION:

$$\begin{aligned} & \% \text{ by wt. Of } H_2O \\ &= \frac{\text{wt. of } H_2O}{\text{Total wt.}} \times 100 \\ 50 &= \frac{18x}{142 + 18x} \\ & \times 100 \end{aligned}$$

$$71 + 9x = 18x$$

$$x = 71 / 9 = 7.88 \approx 8$$

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Q-23 - 11468619

Causticisation process is used for the preparation of

(A) Caustic soda

(B) Caustic potash

(C) Slaked lime

(D) Sodium carbonate

CORRECT ANSWER: A

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Q-24 - 11468441

Choose the correct answers:

a. Which of the following alkali metal is the most electropositive ?

i. Na , ii. K , iii. Rb , iv. Cs

b. Which of the following alkali metals has the lowest m.pt. ?

i. Li , ii. K , iii. Na , iv. Rb

c. Which of the following is the stronger reducing agent ?

i. Li , ii. Na , iii. K , iv Rb

SOLUTION:

- a. (iv) Cs, because of its low IE values.
- b. (iv) Rb, metallic bonding is weakest in Rb.
- c. (i) Li.

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Q-25 - 11468623

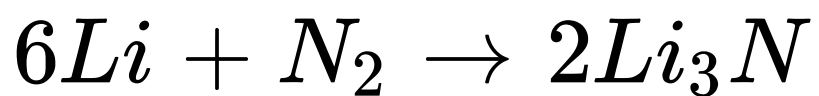
Which of the following elements combines directly with nitrogen to form its nitride ?

- (A) Li
- (B) Na
- (C) K
- (D) Rb

CORRECT ANSWER: A

SOLUTION:

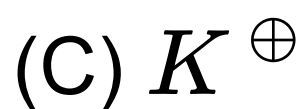
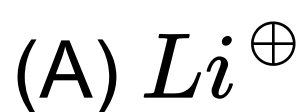
Only Li reacts with N_2 to form stable nitride



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Q-26 - 11468634

Which of the following is strongly hydrated in aqueous solution ?



CORRECT ANSWER: A

SOLUTION:

Li^{\oplus} due to highest positive charge density gets hydrated to maximum extent.

Q-27 - 11468636

Which of the following alkali metal does not form alum ?

- (A) Li
- (B) Na
- (C) K
- (D) Rb

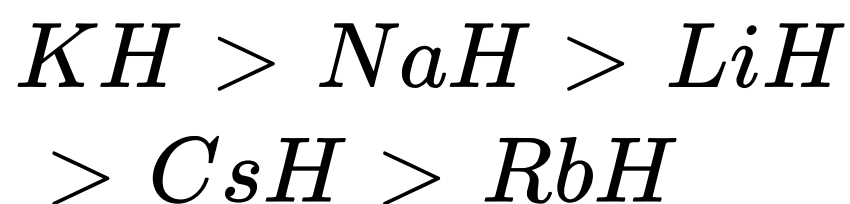
CORRECT ANSWER: A

SOLUTION:

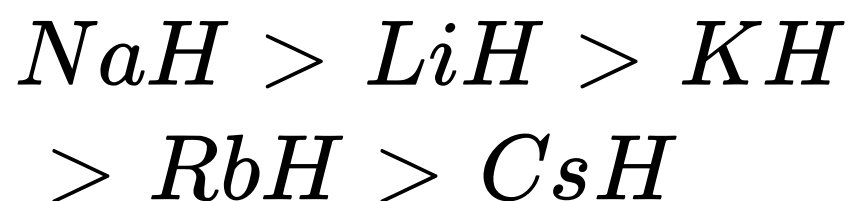
Li^{\oplus} ion due to its small size does not form a stable lattice structure.

The alkali metals form salt like hydrides by the direct synthesis at elevated temperature. The thermal stability of these hydrides decreases in which of the following orders ?

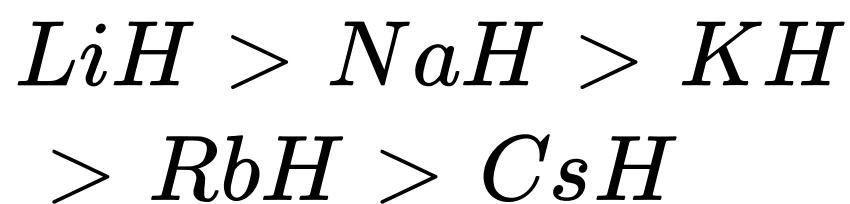
(A)



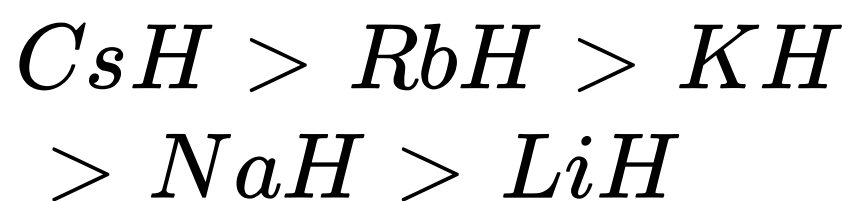
(B)



(C)



(D)



CORRECT ANSWER: C

SOLUTION:

The tendency to form their hydrides, basic character and stability decreases from Li to Cs since the electropositive character decreases from Cs to Li .

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Q-29 - 11468664

shine at freshly cut sodium is because of

- (A) Oscillations of free electrons
- (B) Weak metallic bonding
- (C) Absorption of light in crystal lattice
- (D) Presence of free valency at the surface

CORRECT ANSWER: A

Q-30 - 18255521

Sodium peroxide, a yellow solid, when exposed to air becomes white due to the formation of



CORRECT ANSWER: D

SOLUTION:

In the presence of moisture and CO_2 , Na_2O_2 is converted into $NaOH$ and Na_2CO_3

Q-31 - 12661020



(A) H_2

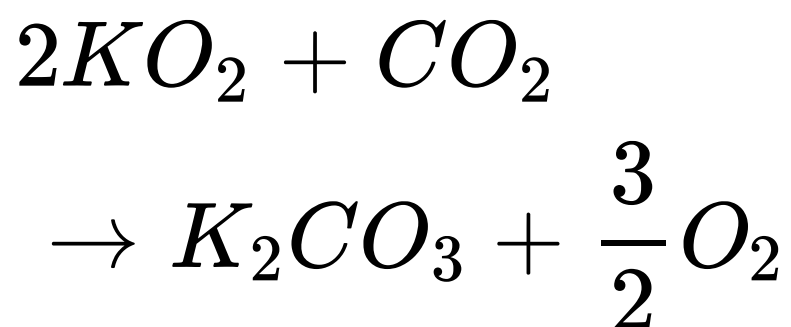
(B) N_2

(C) O_2

(D) CO

CORRECT ANSWER: C

SOLUTION:



Q-32 - 11468448

Arrange the following in order of the increasing covalent character:

MCl , MBr , MF , MI (where M = alkali metals)

SOLUTION:

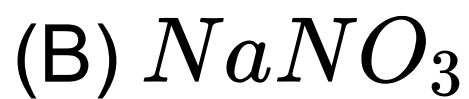
	$MF < MCl < MBr < MI$
Size of anion	$F^- < Cl^- < Br^- < I^-$
Degree of polarisation	$F^- < Cl^- < Br^- < I^-$
Covalent character	$MF < MCl < MBr < MI$

With increasing size of the anion, degree of polarisation by the cation increases and hence the covalent character increases.

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Q-33 - 11468697

One of the natural minerals of sodium is tincal. Its formula is



CORRECT ANSWER: C

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Q-34 - 11468832

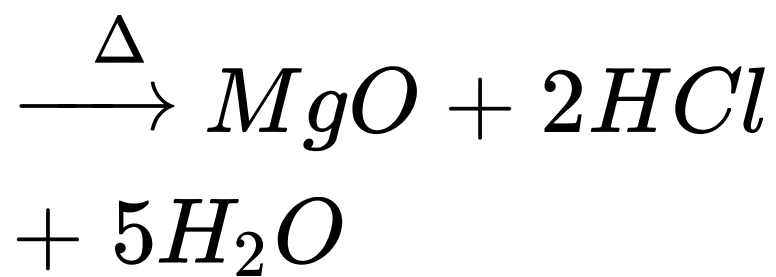
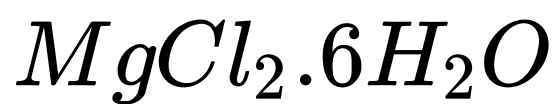
(a). Give an example of laboratory desiccant.

(b). What are the products formed when $MgCl_2 \cdot 6H_2O$ is heated?

SOLUTION:

a. Anhydrous $CaCl_2$.

b.



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Q-35 - 11468833

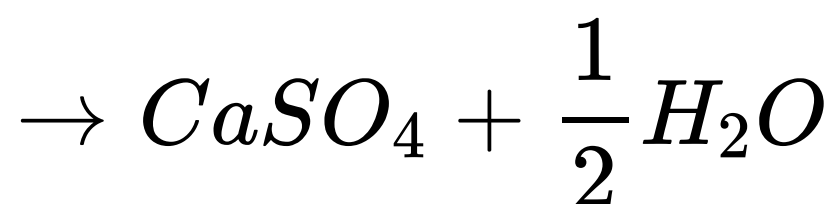
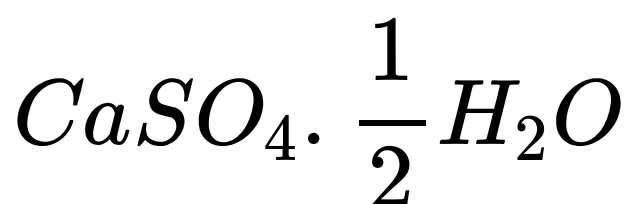
Plaster of paris on losing water and gaining water gives A and B .

Identify A and B .

SOLUTION:

Plaster of paris is $CaSO_4 \cdot \frac{1}{2}H_2O$

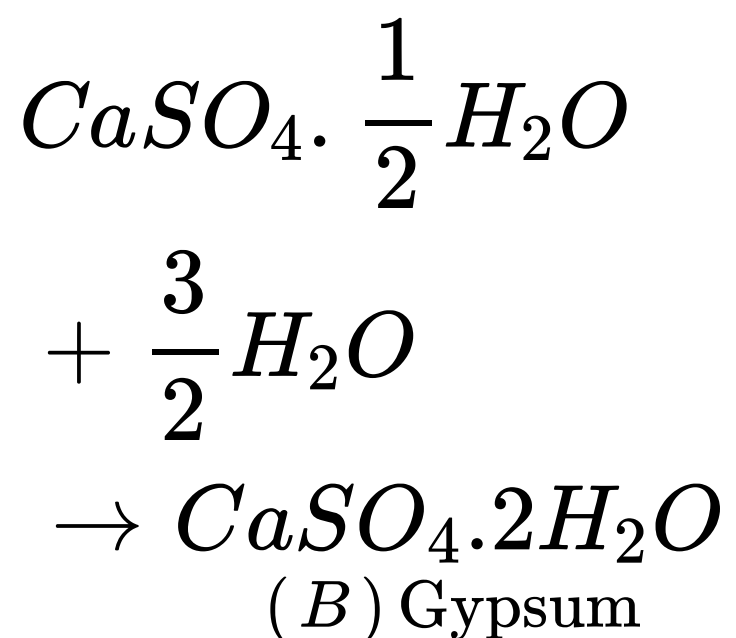
On losing water, it forms $CaSO_4$



(A

) Dead burn plaster

On gaining water, it forms



(A) and (B) are $CaSO_4$ and $CaSO_4 \cdot 2H_2O$ respectively.

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Q-36 - 11468836

Which is the weakest base among $NaOH$, $Ca(OH)_2$, KOH and $Be(OH)_2$.

SOLUTION:

$Be(OH)_2$ is the weakest base, since alkali metal

hydroxides are stronger base than alkaline earth metal

hydroxides. Also, basic character of hydroxides increases on moving down the group. Hence, $Be(OH)_2$ is the weakest base.

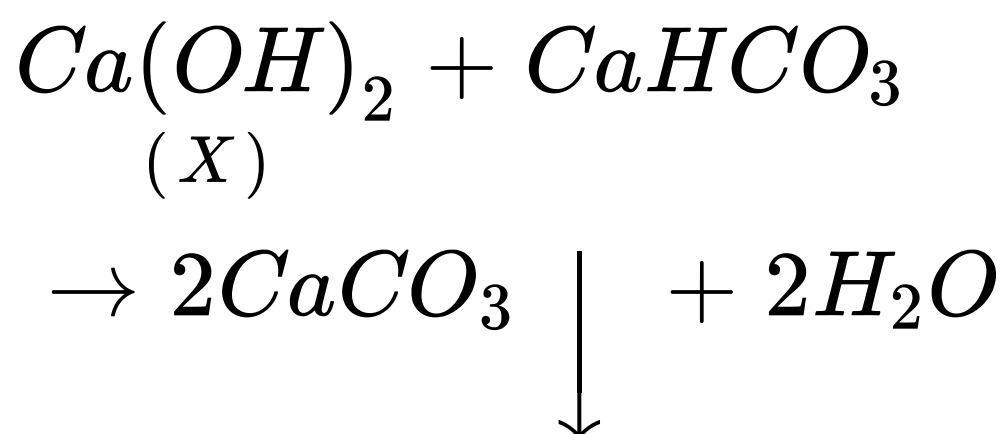
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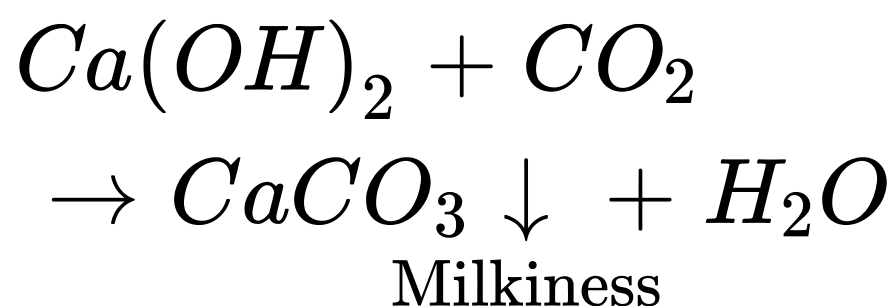
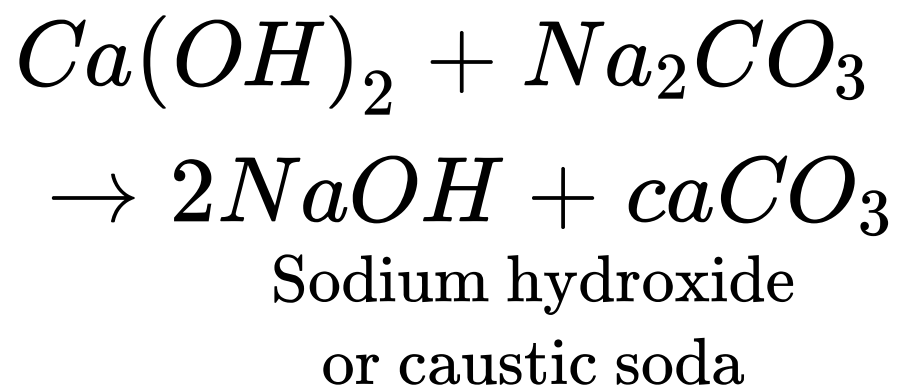
Q-37 - 11468840

Chemical (X) is used for water softening to remove temporary hardness. (X) reacts with sodium carbonate to generate caustic soda. When CO_2 is bubbled through (X)?

SOLUTION:

$Ca(OH)_2$ is used for water softening to remove temporary hardness.

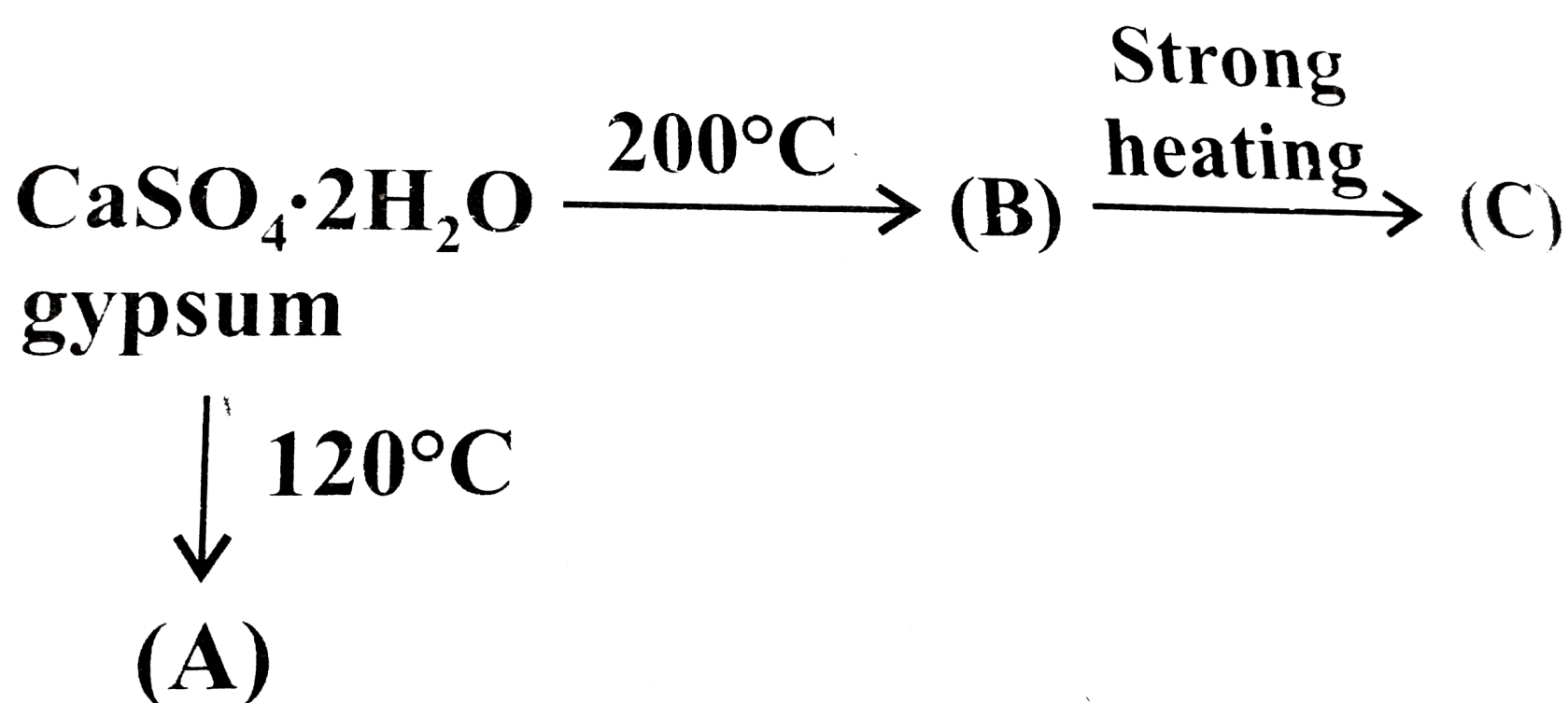




Hence, (XX) is $Ca(OH)_2$.

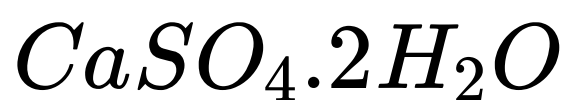
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Q-38 - 11468844

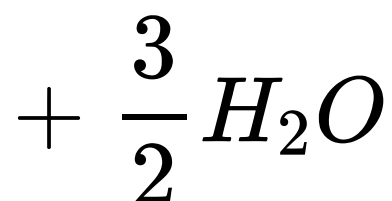
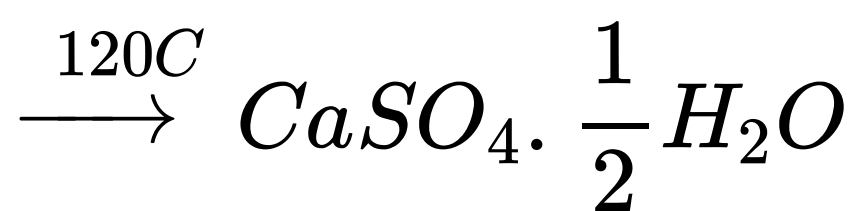


Identify (A), (B) and (C).

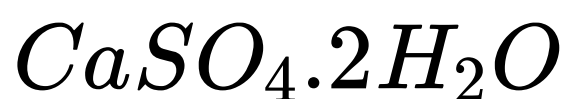
SOLUTION:



Gypsum

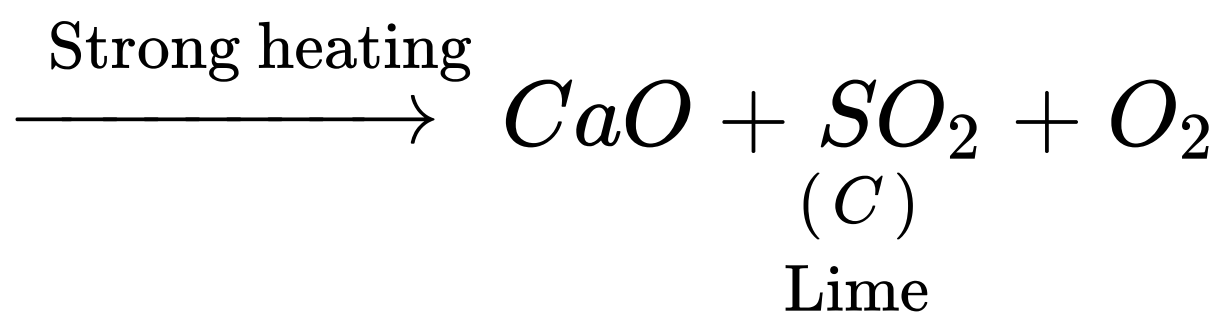


(A) Plaster of paris



(B)

Death burnt plaster



(C)

Lime

Hence, (A) is plaster of paris, $CaSO_4 \cdot \frac{1}{2}H_2O$, (B) is dead burnt plaster, $CaSO_4$ and (C) is lime, CaO .

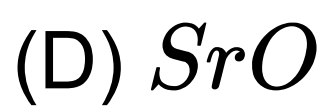
Sodium sulphate is soluble in water but barium sulphate is sparingly soluble because

- (A) The hydration enthalpy of Na_2SO_4 is more than its lattice enthalpy.
- (B) The lattice enthalpy of $BaSO_4$ is more than its hydration enthalpy.
- (C) The lattice enthalpy has no role to play in solubility.
- (D) The lattice enthalpy of Na_2SO_4 is more than its hydration enthalpy.

CORRECT ANSWER: A::B

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The alkaline earth metals forming ionic oxides are



CORRECT ANSWER: B::C::D

SOLUTION:

Due to less charge/radius ratio, Mg^{2+} , Ca^{2+} and Sr^{2+} polarise O^{2-} to smaller extent and hence the oxides formed (MgO , CaO , SrO) are ionic.

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Which of the following groups of elements have properties that are most similar?

(A) Sr

(B) Ca

(C) Ba

(D) Be

CORRECT ANSWER: A::B::C

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Q-42 - 11468990

Be and Al exhibit many properties which are similar. But the two elements differ in

(A) Forming covalent bonds

(B) Forming polymeric hydrides

(C) Exhibiting maximum covalency in compounds

(D) Exhibiting amphoteric nature in their oxides

CORRECT ANSWER: C

SOLUTION:

Be exhibits maximum coordination 4, whereas *Al*, due to the presence of low lying *d* — orbital has coordination number 6.

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Q-43 - 16112946

Which of the following pairs can be distinguished by action of heat?

i. K_2CO_3 and $CaCO_3$

ii. Na_2CO_3 and $Mg(NO_3)_2$

iii. $Mg(NO_3)_2$ and $NaNO_2$

(A) i and ii

(B) i and iii

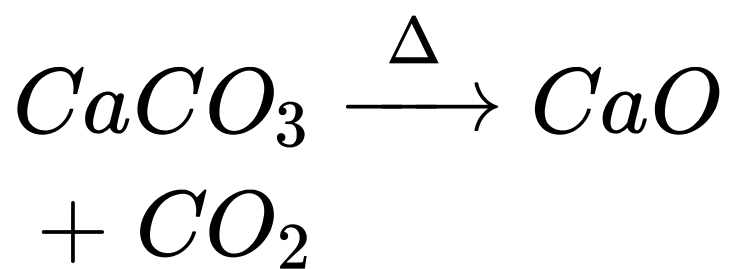
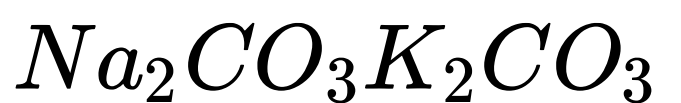
(C) i, ii, iii

(D) none of these

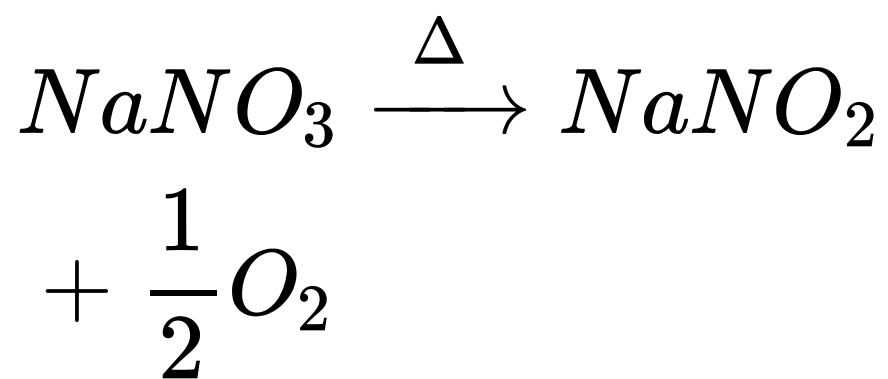
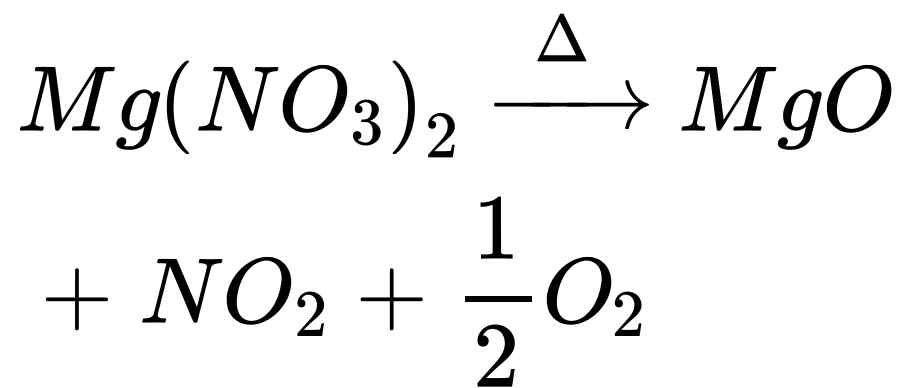
CORRECT ANSWER: C

SOLUTION:

i.



iii.



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Q-44 - 11468911

The hydration enthalpy of Mg^{2+} ion is higher than that of

- (A) Al^{3+}
- (B) Be^{2+}
- (C) Na^{\oplus}
- (D) K^{\oplus}

CORRECT ANSWER: C::D

SOLUTION:

Mg^{2+} ion has greater charge/radius ratio as compared to Na^{\oplus} and K^{\oplus} and hence has higher hydration enthalpy.

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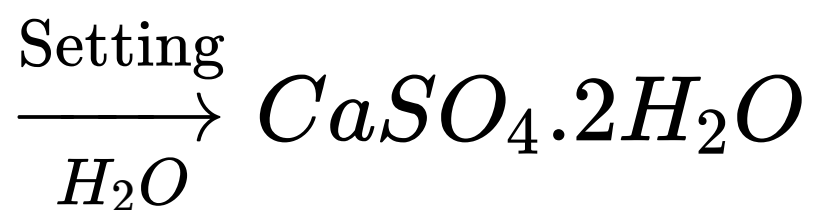
Q-45 - 12676659

Plaster of Paris hardens by

- (A) giving off CO_2
- (B) utilizing water
- (C) changing into $CaCO_3$
- (D) giving out water

CORRECT ANSWER: B

SOLUTION:



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Q-46 - 11468914

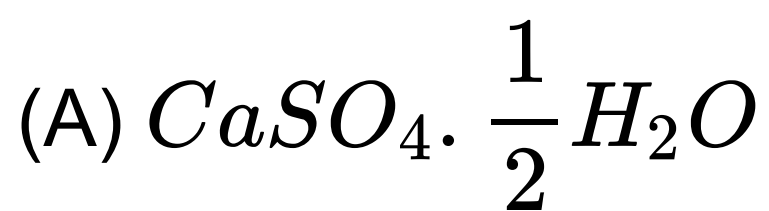
Select the correct statements about barium:

- (A) It shows photoelectric effect.
- (B) It is silvery white metal.
- (C) It forms $Ba(NO_3)_2$ which is used in preparation of green fire.
- (D) Its ionisation enthalpy is less than radium.

CORRECT ANSWER: B::C::D

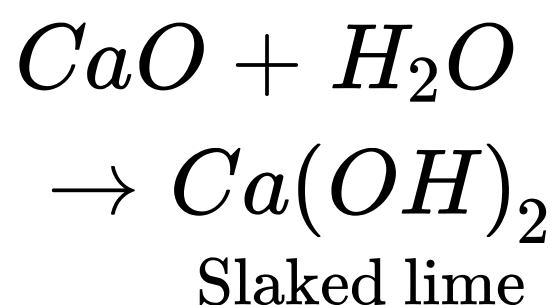
Q-47 - 11468934

Slaked lime is obtained when water is added to



CORRECT ANSWER: C

SOLUTION:



Which of the following is not present in cement ?

(A) Gypsum

(B) Clay

(C) Almina

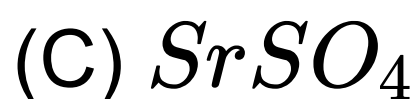
(D) Alum

CORRECT ANSWER: D

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Which of the following compound is most soluble in water?

(A) $MgSO_4$



CORRECT ANSWER: A

SOLUTION:

Lattice enthalpy decreases less rapidly as compared to hydration enthalpy in case of alkaline earth metal sulphates.

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Q-50 - 16017640

Which of the following compound decomposes at highest temperature-



(B) $BaCO_3$

(C) $CaCO_3$

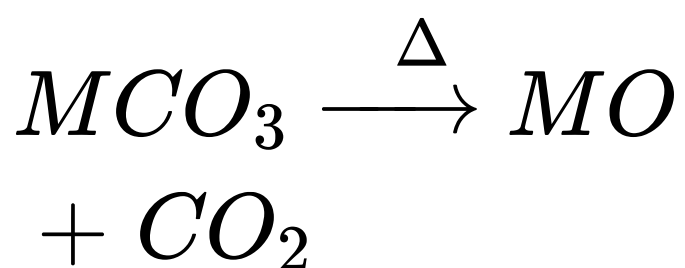
(D) $MgCO_3$

CORRECT ANSWER: B

SOLUTION:

$BaCO_3$ decomposes at highest temp.

All the carbonates decompose on heating to give CO_2 and metal oxide.



The stability of carbonate towards heat depends upon the stability of the resulting metal oxide. More is the stability of the resulting metal oxide lesser is the stability of the carbonate towards heat and vice versa.

Q-51 - 11469028

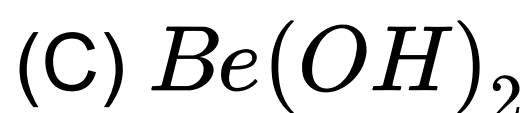
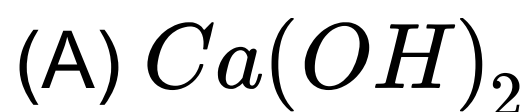
Assertion (A): $Be(OH)_2$ is soluble in $NaOH$.

Reason (R): $Be(OH)_2$ is amphoteric in nature.

- (A) If both (A) and (R) are correct and (R) is the correct explanation of (A).
- (B) If both (A) and (R) are correct, but (R) is not the correct explanation of (A).
- (C) If (A) is correct, but (R) is incorrect.
- (D) If (A) is incorrect, but (R) is correct.

CORRECT ANSWER: A

Of the following , and amphoteric hydroxide is



CORRECT ANSWER: C

SOLUTION:

Due to the smallest size and highest ionisation enthalpy of Be , $Be(OH)_2$ is amphoteric, i.e. reacts both with an acid and a base.

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Which of the following fluoride is more soluble in water?



CORRECT ANSWER: B

SOLUTION:

Hydration enthalpy of small and highly charged Be^{2+} is too high that it compensates for the high lattice enthalpy.

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Which of the following metal reacts with cold H_2O with the evolution of H_2 gas?

(A) Ca

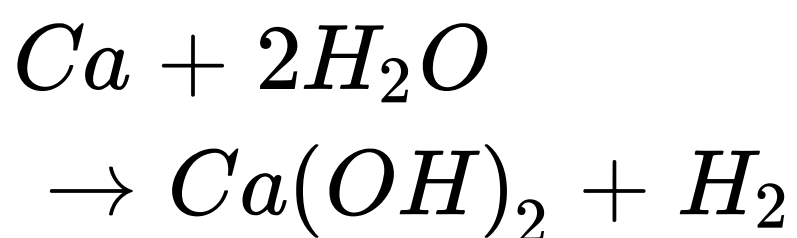
(B) Al

(C) Zn

(D) Cu

CORRECT ANSWER: A

SOLUTION:



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Q-55 - 11468962

Which of the following does not contain the true peroxide ion?

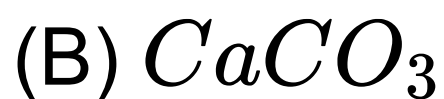


CORRECT ANSWER: B

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Q-56 - 11468965

Which of the following alkaline earth metal carbonate is thermally least stable?



CORRECT ANSWER: A

SOLUTION:

Due to incompatibility in size of Be^{2+} and CO_3^{2-} ions

$BeCO_3$ is thermally least unstable.

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Q-57 - 11468973

Which of the following is used as an antacid?

(A) MgO

(B) $Mg(OH)_2$

(C) $MgSO_4$

(D) $MgCO_3$

CORRECT ANSWER: B

SOLUTION:

Due to strong basic character of $Mg(OH)_2$.

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Q-58 - 11468976

Mg burns in air to give

(A) Mg_3N_2

(B) MgO

(C) MgO and Mg_3N_2

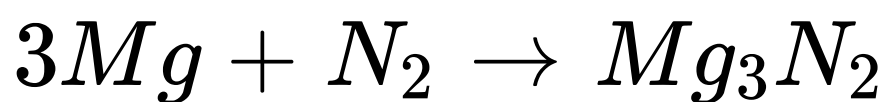
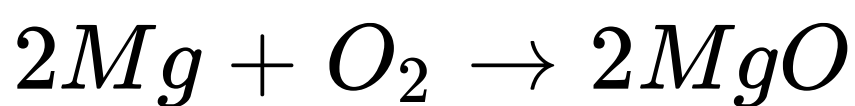
(D) MgO and Mg_3N_2

CORRECT ANSWER: C

SOLUTION:

Mg reacts both with O_2 and N_2 present in air to form

MgO and Mg_3N_2 .



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Q-59 - 11468985

Bleaching powder loses its power on keeping for a long time because

- (A) It absorbs moisture
- (B) It changes into calcium hypochlorite
- (C) It changes into calcium and calcium chlorate
- (D) It cahnges salt of calcium chloride and calcium hydroxide

CORRECT ANSWER: B

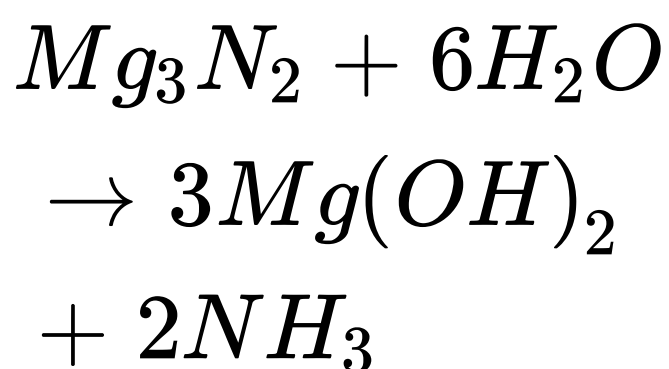
Q-60 - 11468989

One mole of magnesium nitride on reaction with an excess of water gives

- (A) One mole of NH_3
- (B) Two moles of NH_3
- (C) One mole of HNO_3
- (D) Two moles of HNO_3

CORRECT ANSWER: B

SOLUTION:



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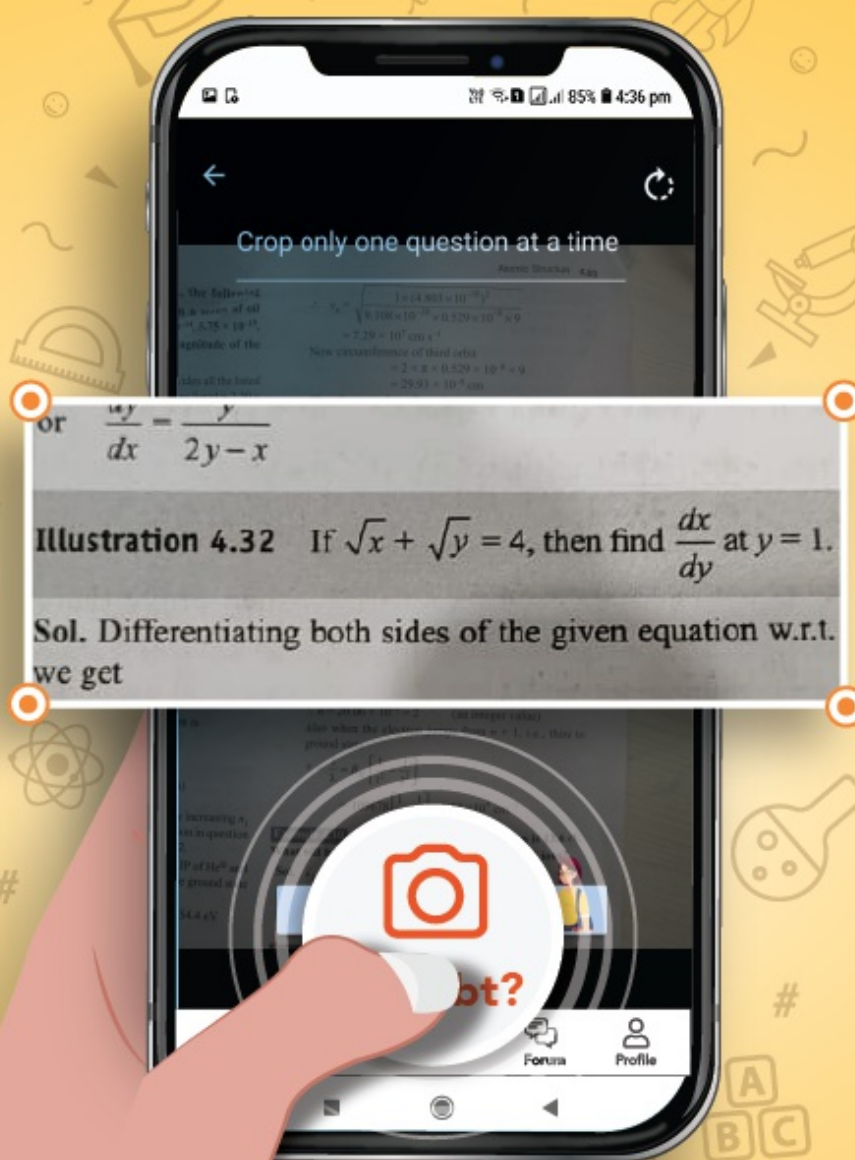


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