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## Guess Paper - 2014 <br> Class - X <br> Subject -Science

## (PERIODIC CLASSIFICATION OF ELEMENTS)

1. Do Dobereiner's triads also exist in the columns of Newland's octaves? Compare and find out.
2. What were the limitations of Dobereiner's classification?
3. What were the limitations of Newland's Law of Octaves?
4. Use Mendeleev's Periodic Table to predict the formulae for the oxides of the following elements: K, (ii) C, (iii) Al, (iv) Si and (v) Ba.
5. Besides gallium, which other elements have since been discovered that were left by Mendeleev in his periodic table? (any two)
6. What were the criteria used by Mendeleev in creating his periodic table?
7. Why do you think, the noble gases are placed in a separate group?
8. How and why does the atomic size vary as you go: (i) from left to right across a period? (ii) down a group?
9. Why was there a necessity for classification of elements? Give at least two reasons.
10.Name an alkali metal, other than lithium, sodium and potassium.
11.Name an alkaline earth metal other than calcium, strontium and barium.
12.Name one halogen, other than chlorine, bromine and iodine.
13.Name a non-metal having properties similar to carbon.
10. What is the achievement of Dobereiner's Law of Triads?
15.State two achievements of Law of Octaves.
16.Give the name and symbol of the element that occupies each of the following positions in the periodic table:(i) Period 2, group 13 (ii) Period 1, group 1 (iii) Period 4, group 2 (iv) Period 3, group 17
11. An element $X$ belongs to group 17 and third period of the periodic table.
(a)Write electronic configuration of the element. What is its valency?
(b) Predict its nature, whether it is a metal or non-metal.
(c)Give the formula of the compound formed when it combines with an element $Y$ having valency three.

BY: AJAI KR. SHUKLA

# RACHNA TUTORIALS 

## 6/1003 JANKIPURAM VISTAR LUCKNOW (MO.9453292712)

(PERIODIC CLASSIFICATION OF ELEMENTS)

1. Triad of Li , Na and K exists in Newland's octave. Triad of $\mathrm{Cl}, \mathrm{Br}$ and I does not exist, because there are Co and Ni in between Cl and Br . Triad of $\mathrm{Ca}, \mathrm{Sr}$ and Ba does not exist, because there is Zn in between Ca and Sr .
2. Classification into triads left room for chance. It is possible to group quite dissimilar elements into a triad. 2. Quite a large number of elements cannot be grouped into a triad.
3. It did not include all the elements known at that time. 2. It did not recognise the transition elements. 3. Position of hydrogen was not justified along with fluorine and chlorine.
4. (i) $K$ (potassium) belongs to group I. Thus, formula of its oxide is $K 2 O$, as its valency is 1 .(ii) C (carbon) belongs to group IV. Thus, formula of its oxide is CO 2 , as its valency is 4. (iii) Al (aluminium) belongs to group III. Thus, formula of its oxide is $\mathrm{Al2O3}$, as its valency is 3. (iv) Si (silicon) belongs to group IV. Thus, formula of its oxide is SiO 2 , as its valency is 4 . (v) Ba (barium) belongs to group II. Thus, formula of its oxide is BaO , as its valency is 2 .
5. Eka-silicon which is Germanium in group IIIA. 2. Eka-boron which is Scandium in group III B.
6. The chemical and physical properties of an element is the periodic function of its atomic mass. 2. The elements were arranged in a period such that their properties changed from metallic to non-metallic.
7. The elements were arranged in groups, such that all the elements have same, but graded physical and chemical properties.
8. Noble gases are chemically inactive and hence constitute a separate group. 2. Noble gases as a group offer a perfect dividing line for starting a new period in the periodic table.
9. Atomic size decreases on moving from left to right across a period. This is due to the increase in nuclear charge which tends to pull the electrons closer to the nucleus and reduces the size of the atom.
(ii) Atomic size increases on moving down a group. This is due to addition of new shells which increases the distance between the outermost electrons and the nucleus even though nuclear charge increases.
10. Classification leads to correlate the properties of elements with the fundamental properties which is a characteristic of all elements.
(ii) Classification further reveals the relationship between one element with another element.
11. Rubidium
12. Magnesium
13. Fluorine
14. Silicon
15. The basic achievement of Law of Triads is that it recognised for the first time, the relationship between the atomic mass and the physical and chemical properties of an element.
16. (i) Atomic mass of an element was recognised as the basis of classification.
(ii) The periodicity (repetition of properties) as a fundamental property of elements was recognised for the first time.
17. (i) Element is boron
(iii) Element is calcium
(ii) Element is hydrogen
(iv) Element is chlorine
18. (a) Electronic configuration - 2, 8, 7. Its valency is one.
(b) It is a non-metal (c) Y X3

## rachina tutorlals

## 6/1003 JANKIPURAM VISTAR LUCKNOW (MO.9453292712)

Science Class X (Term II) Reflection and Refraction SHORT ANSWER QUESTIONS-I (2 Marks)

1. Give one use of each: (i) regular reflection (ii) irregular reflection.
2. State four characteristics of image formed in a plane mirror.
3. Give any two uses of plane mirrors other than looking glass.
4. Convex mirror and a plane mirror form virtual images. How will you distinguish between the two by looking at the images of an object?
5. State two uses of concave mirrors.
6. An object 1 cm high produces a realimage 1.5 cm high, when placed at a distance of 15 cm from concave mirror. Calculate the position of image.
7. State two uses of convex mirrors.
8. The image of an object is formed on itself when placed at a distance of 30 cm from concave mirror. What is the focal length of concave mirror?
9. State the characteristics of image formed, when an object is between infinity and the centre of curvature of a concave mirror.
10. Light coming from the bottom of a water tank does not come out of the water. What should be the minimum angle of incidence for the same?
11. An object is placed at a distance of 25 cm from the pole of a spherical mirror which forms a real, inverted image on the same side of object at 37.5 cm from the pole. Calculate the focal length of mirror and find nature of the mirror.
12. Why does a tank filled with water appear shallow? Explain.
13. Why does a fisherman aim at the tail of a fish, during spear fishing?
14. An object is placed anywhere between the pole and infinity in case of a convex mirror. State the characteristics of the image.
15. What name is given to linear distance between the pole and principal focus of a spherical mirror? If this distance is 25 cm , how far is the centre of curvature from the pole of the spherical mirror.
16. The velocity of light in air is $3 \times 10^{8} \mathrm{~ms}^{-1}$ and in diamond is $1.2 \times 10^{8} \mathrm{~ms}^{-1}$. Find the refractive index of diamond.
17. State two factors which determine lateral displacement of ray of light passing through a rectangular glass slab.
18. Show the path of a ray of light through a rectangular glass block, showing clearly thelateral displacement of the ray of light.
19. The refractive index of flint glass is 1.60 and that of water is 1.33 with respect to air. What is the refractive index of flint glass with respect to water?
20. Give two uses of convex lens.
21. Give two uses of concave lens.
22. State whether the following are positive or negative when a convex lens forms real image :(i) distance of object from lens (ii) distance of image from lens.
23. State whether the following are positive or negative when a concave lens forms a virtual image: (i)distance of image from lens (ii) focal length of lens.
24. Light enters from air to water having refractive index $4 / 3$. What is the speed of light in water? Speed of light in vacuum is $3 \times 10^{8} \mathrm{~ms}^{-1}$.
25. The focal length of the glasses of a short-sighted person is 37.5 cm . Calculate the power of glasses and their nature.

## RACHNA TUTORLALS

## 6/1003 JANKIPURAM VISTAR LUCKNOW (M0.9453292712)

 Periodic Classification of Elements(SAII)
## CLASS X

1. Why was there a necessity for classification of elements? Give at least two reasons.
2. State two achievements of Law of Octaves.
3. Can the following groups of elements be classified as Dobereiner's triad? (a) $\mathrm{Na}, \mathrm{Si}, \mathrm{Cl}$ (b) $\mathrm{Be}, \mathrm{Mg}, \mathrm{Ca}$ Atomic mass of $\mathrm{Be} 9 ; \mathrm{Na} 23 ; \mathrm{Mg} 24 ; \mathrm{Si} 28 ; \mathrm{Cl} 35 ; \mathrm{Ca} 40$.Explain by giving reason.
4. (i) What are transition elements? (ii) Which amongst the following are transition elements? $\mathrm{K}, \mathrm{Mn}, \mathrm{Ca}, \mathrm{Cr}, \mathrm{Cu} \mathrm{Cs}$, Fe and Pt .
5. Give the name and symbol for the element that occupies each of the following positions in the periodic table :
(i) Period 2, group 13
(ii) Period 1, group 1
(iii) Period 4, group 2
(iv) Period 3, group 17
6. Silicon and phosphorus (atomic no. 14 and 15 ,respectively) belong to the same period of the long form of the periodic table. Write down their electronic configurations and state in which group these elements occur.
7. How many periods are called short periods in the long form of the periodic table? Give their : (i) periodic numbers, (ii) number of elements in each period, (iii) name one element in each period.
8. Amongst the elements given below, pick out the elements which are : (i) most electropositive, (ii) most electronegative and (iii) noble gas. Li, Be, B, C, N, O, F, Ne, Na, Mg, Al, Si, P, S, Cl, Ar, K and Ca.
9. How is the atomic volume of sodium related to (i) magnesium and (ii) potassium?
10. $\mathrm{P}(186 \mathrm{pm}), \mathrm{Q}(231 \mathrm{pm}), \mathrm{R}(152 \mathrm{pm}) \mathrm{P}, \mathrm{Q}$ and R are the elements, such that their atomic radii is shown in brackets. Furthermore, they have same number of electrons in their valence shell. (i) Do these elements belong to the same group or same period?(ii) Arrange the elements, such that the most metallic element comes first and the least metallic element comes last.
11. Mendeleev predicted the existence of certain elements not known at that time and named two of them as Ekasilicon and Ekaaluminium. (d) How many valence electrons are present in each one of them?
12. Identify and name the metals out of the following elements whose electronic configurations are given below: (a) 2 , 8,2 (b) $2,8,1$ (c) $2,8,7$ (d) 2,1
B. QUESTIONS FROM CBSE EXAMINATION PAPERS
13. State two main properties of elements on which Mendeleev's periodic classification was based. Why could no fixed position be assigned to hydrogen in his periodic table?
14. (a) What is meant by periodicity in properties of elements with reference to the periodic table? (b) Why do all elements of the same group have similar properties?
15. Two elements M and N belong to groups I and II respectively and are in the same period of the periodic table. How do the following properties of M and N vary? (i) Sizes of their atoms(ii) Their metallic characters (iii) Their valencies in forming oxides (iv) Molecular formulae of their chlorides
16. The elements of the third period of the periodic table are given below:

| Group $\rightarrow$ | I | II | III | IV | V | VI | VII |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| Period | Na | Mg | Al | Si | P | S | Cl |

(a) Which atom is bigger, Na or Mg ? Why? (b) Identify the most (i) metallic (ii) non-metallic element, in period 3. 5. An element has electronic configuration $2,8,3$. What is the atomic number of this element? To which (i) group and (ii) period this element belong?
6. State the positions of (i) isotopes of the same element and (ii) hydrogen in the Modern Periodic Table.
7. How does the tendency to gain electrons change as we go down the 16 th group of periodic table? Why?
8. Give reasons for the following : (a) Lithium atom is smaller than sodium atom. (b) Chlorine (atomic Number 17) is more electronegative than sulphur (atomic Number 16).

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## 6/1003 JANKIPURAM VISTAR LUCKNOW (M0.9453292712)

## Human Eye and Colourful World

1. Why does the clear sky appear blue? How would the sky appear in the absence of earth's atmosphere?
2. Why do we observe difference in colours of the Sun during sunrise, sunset and noon?
3. A person needs a lens of power -0.5 dioptre for correcting his distant vision. For correcting his near vision he needs a lens of power $+\mathbf{1 . 5}$ dioptre. What is the focal length of the lens required for correcting his (i) distant vision (ii) near vision?
4. Why does it take some time to see the objects in a dim room when we enter the room from bright sunlight outside?
5. Why does it take some time to see objects in a cinema hall when we just enter the hall from bright sunlight? Explain in brief.
6 (a) What is "power of accomodation of the eye"?
7 Explain the structure and functioning of the human eye. How are we able to see nearby as well as distant objects?
8 When do we consider a person to be myopic or hypermetropic? Explain using diagrams how the defects associated with myopic and hypermetropic eye can be corrected?
9 Explain the refraction of light through a triangular glass prism using a labelled ray diagram. Hence define the angle of deviation.
10 How can we explain the reddish appearance of sun at sunrise or sunset? Why does it not appear red at noon?
11 Explain the structure and functioning of the human eye. How are we able to see nearby as well as distant objects?

12 When do we consider a person to be myopic or hypermetropic? Explain using diagrams how the defects associated with myopic and hypermetropic eye can be corrected?
13 A person cannot see the objects distinctly, when placed beyond 2 m . (a) Identify the eye defect. (b) Give two reasons for this defect. (c) Calculate the power and nature of the lens he should be using to see the distant objects clearly. (d) Draw the ray diagrams for the defective and the correct eye.
14 (a) What is Myopia? State two causes of Myopia. With the help of a labelled ray diagram show the correction of Myopia using appropriate lens. (b) The near point of a hypermetropic eye is $\mathbf{1 m}$. Find the power of the lens required to correct this defect. Assume that near point of the normal eye is 25 cm .
15 What is hypermetropia? State two causes of hypermetropia. Draw a labelled ray diagram to show how this defect may be corrected using spectacles of appropriate focal length. (b) The near point of a hypermetropic eye is 1.0 m . Find the power of the lens required to correct this defect. The least distance of distinct vision for a normal eye is 25 cm .
16 (a)Explain, how is the power of loose accommodation of human eye achieved.(b) Why does the sun appear reddish early in the morning? Explain with a diagram. (c) Why does the sky appears dark instead of blue to astronauts? .
17 Why is the normal eye unable to focus on an object placed within 10 cm from the eye?
18 What is dispersion of white light? What is the cause of such dispersion? Draw a diagram to show the dispersion of white light by a glass prism.

## RACHNA TUTORLALS

## 6/1003 JANKIPURAM VISTAR LUCKNOW (M0.9453292712) LIGHT-REFLECTION AND REFRACTION CLÁSS X (SA II)

1. An object is placed at a distance of 10 cm from a convex mirror of focal length 15 cm . Find the position and the nature of the image.
2. An object 5.0 cm in length is placed at a distance of $\mathbf{2 0} \mathrm{cm}$ in front of a convex mirror of radius 30 cm . Find the position of image, its nature and size.
3. An object of size 7.0 cm is placed 27 cm in front of concave mirror of focal length 18 cm . At what distance from the mirror, should a screen be placed, so that a sharp focussed image can be obtained ? Find the size and nature of the image.
4. Name the type of mirror used in the following situations :
(a) Headlights of a car
(b) Side/ rear-view mirror of a vehicle
(c) Solar furnace. Support your answer with reasons.
5. How can you identify the three types of mirrors without touching?
6. (a) What happens to a ray of light when it travels from one medium to another having equalrefractive indices?
(b) State the cause of refraction of light.

7 Give one use of each :
(i) regular reflection
(ii) irregular reflection.

8 State four characteristics of an image formed in a plane mirror.
9 State the laws of reflection.
10 Give any two uses of plane mirror other than looking glass.
11 State two uses of concave mirrors.
12 State two uses of convex mirrors.

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## RACHNA TUTORLALS

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1. Distance of the object from the convex mirror $(u)=-10 \mathrm{~cm}$ Focal length of the convex mirror $(f)=15 \mathrm{~cm}$

Distance of the image from the convex mirror $(v)=$ ? Applying, $\frac{1}{V}+\frac{1}{U}=\frac{1}{F} ; \begin{aligned} & \frac{1}{V}+\frac{1}{-10}=\frac{1}{15} \\ & \frac{1}{V}=\frac{1}{15}+\frac{1}{10}\end{aligned}$
$v=\mathbf{6} \mathbf{~ c m}$;Thus, the image is formed at a distance of $\mathbf{6} \mathbf{~ c m}$ behind the mirror. The image is virtual, erect and smaller in size than object.
2. To calculate the position.

Distance of the object from the pole, $(u)=-20 \mathrm{~cm}[u$ is always negative $]$ Distance of the image from the pole,
$(\mathrm{l})=?$ [To be calculated] Focal length of convex mirror, (f) $=\frac{30}{2} \mathrm{~cm}, f==15 \mathrm{~cm}[f$ for convex mirror is positive] Applying, $\frac{1}{V}+\frac{1}{U}=\frac{1}{F} ; \quad \frac{1}{V}=\frac{1}{20}+\frac{1}{15} ; v=8.57 \mathrm{~cm} \quad$ To calculate size : $\frac{h_{i}}{h_{0}}=-\frac{v}{u} ; h_{i}=\frac{5.0(-8.57)}{-20}=2.14 \mathrm{~cm}$, Thus, position of image is 8.57 cm behind the mirror which is diminished to 2.14 cm . It is a virtual and erect image.
3. To calculate the position : Distance of object from the pole, $(u)=-27 \mathrm{~cm}[u$ is always negative $]$ Distance of image from the pole, $(v)=$ ? [To be calculated] Focal length of concave mirror $(f)=-18 \mathrm{~cm}[f$ for concave mirror is negative] Applying, $\frac{1}{V}+\frac{1}{U}=\frac{1}{F} ; v=-\mathbf{5 4} \mathbf{~ c m}$.
Thus, the image is formed at a distance of 54 cm in front of the concave mirror.
(ii) To calculate size $: \frac{h_{i}}{h_{0}}=-\frac{v}{u} ; \quad \frac{h_{i}}{0.7}=\frac{-54}{-27}=-0.14 \mathrm{~cm}$
4. (a)A concave mirror, as it diverges the rays of light when bulb is between P and F .
(b)A convex mirror, as it cover a wide field and forms a small erect image close to the eye of the driver.
(c)A concave mirror, as it concentrates the parallel rays of sun at principal focus.
5. Placing an object in front of a mirror and observing the image of the object for different positions. (i)The image in plane mirror is formed of same size. (ii) The errect and smaller image is formed in conyex mirror. The inverted image of different size beyond focal point and within this point enlarge and errect image is formed in concave mirror.
6. (a) It does not deviate from its path.
(b) When light travels from one medium to another medium its speed changes due to which it deviates from its path.
7. (i) Regular reflection helps in the formation of virtual images as in case of plane mirror.
(ii)Irregular reflection cuts off glare and helps in illuminating the areas where light is not falling directly.
8. (i) Image is erect. (ii) Image is virtual.
(a) Image is of the same size as the object.
(b) Image is formed as far behind the mirror as the object is in front of it.
9. Incident ray, the reflected ray and the normal lie in the same plane at the point of incidence.
(a) (ii) Angle of incidence at the point of incidence is always equal to angle of reflection.
10. (i) It is used as reflector in box type solar cooker for increasing the concentration of solar radiation inside the cooker. (ii) It is used for making reflecting periscope and keleidoscope.
11. (i) Concave mirror are used as reflectors in automobile headlights. (ii) Concave mirrors are used by E.N.T. surgeons to reflect light in the inaccessible parts of ear, nose or throat.
12. (i) Convex mirrors are used as rear view mirrors in automobiles (ii) Convex mirrors are used as reflectors of street light lamp.

## RACHNA TUTORLALS

## 6/1003 JANKIPURAM VISTAR LUCKNOW (M0.9453292712)

## MODEL PAPER( CLASSX SAII)

1. Name the compound formed when ethanol is warmed with ethanoic acid in the presence of a few drops of conc. H2SO4.
[1]
2. What happens to the image distance in the eye when we increase the distance of an object from the eye?
3. Nitrogen (atomic number 7) and phosphorus (atomic number 15) belong to group 15 of the Periodic Table. Write the electronic configuration of these elements. Which of these will be more electronegative? Why?
[2]
4. State two main properties of elements on which Mendeleev's periodic classification was based. Why could no fixed position be assigned to hydrogen in his periodic table.
5. The image of an object is formed on itself when placed at a distance of $\mathbf{3 0} \mathbf{c m}$ from a concave mirror. What is the focal length of the concave mirror?
6. Draw a neat labelled diagram showing the course of a ray of light through an equilateral glass prism and show clearly the angle of incidence and angle of deviation.
7. Why is the sunlight reaching the earth yellowish?
8. How were the following defects of original Mendeleev's Periodic Table resolved in the modified Mendeleev's Period Table? (i) Problem of anomalous pairs. (ii) Position of rare earths (iii) Position of isotopes.
9. Name the reaction which is commonly used in the conversion of vegetable oils to fats. Explain the reaction involved in detail.
10. A concave lens has a focal length 15 cm . At what distance should an object 10 cm long be placed so that it forms an image 10 cm from the lens? Find the nature and size of the image formed.
11. Draw a ray diagram showing the path of rays of light when it incidence.(i) from air into water (ii) from water into air.
[3]
12. Make a diagram to show how hypermetropia is corrected. The near point of a hypermetropic eye is 1 m . What is the power of lens required to correct this defect? Assume that the near point of the normal eye is 25 cm .
[3]
13. Two thin lenses of power + 2.5 D and -1.5 D are placed in contact with each other. Calculate : (a) power of the combination, (b) focal length of the combination.
14. One half of a convex lens is covered with a black paper. Will this lens produce a complete image of the object? Verify your answer and explain your observation.
15. P1 and P2 are the power of two thin lenses. What is the power $P$ when both lenses are placed in contact with one another?
[5]
16. A bright nail is placed in a beaker containing aqueous copper sulphate solution. When the iron nail is taken out of copper sulphate solution after 15 minutes, its surface is coated with : (a) reddish deposit (b) greenish deposit (c) black deposit (d) white deposit
17. Ethanoic acid reacts with sodium bicarbonate : (a) vigorously with lot of effervescence (b) slowly a. (c) at a moderate rate without effervescence (d) none of these
18. The odour of acetic acid resembles that of: (a) rose (b) burning plastic (c) vinegar (d) kerosene
19. A ray of light travelling through medium $A$ enters medium $B$, such that it bends away from the normal at the surface of separation. From this observation, we can say that medium $B$ is :(a) denser than medium $A(b)$ rarer than medium $A(c)$ of the same optical density as $A(d)$ none of these

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