

## LESSON PLAN

SUBJECT-CHEMISTRY

CLASS-XII

MASTER TOPIC-P-BLOCK ELEMENTS

TOPIC -GROUP 18

COMPETENCY/CONCEPTS-UNDERSTANDING ,DISCOVERING FACTS.

CONCEPT DETAILS-The noble gases make a group of chemical elements with similar properties: under standard conditions, they are all odorless, colorless, monatomic gases with very low chemical reactivity. The six noble gases that occur naturally are helium (He), neon (Ne), argon (Ar), krypton (Kr), xenon (Xe), and the radioactive radon (Rn). The noble gases make a group of chemical elements with similar properties: under standard conditions, they are all odorless, colorless, monatomic gases with very low chemical reactivity. The six noble gases that occur naturally are helium (He), neon (Ne), argon (Ar), krypton (Kr), xenon (Xe), and the radon.

**Group 18  
The Noble Gases**

|                     |
|---------------------|
| Helium<br>2<br>He   |
| Neon<br>10<br>Ne    |
| Argon<br>18<br>Ar   |
| Krypton<br>36<br>Kr |
| Xenon<br>54<br>Xe   |
| Radon<br>86<br>Rn   |

## Physical and atomic properties

| Property[11][24]                                   | Helium   | Neon   | Argon  | Krypton | Xenon | Radon |       |      |
|--|----------|--------|--------|---------|-------|-------|-------|------|
| Density (g/dm <sup>3</sup> )                       | 0.1786   | 0.9002 | 1.7818 | 3.708   | 5.851 | 9.97  |       |      |
| Boiling point (K)                                  | 4.4      | 27.3   | 87.4   | 121.5   | 166.6 | 211.5 |       |      |
| Melting point (K)                                  | 0.95[25] |        | 24.7   | 83.6    | 115.8 | 202.2 |       |      |
| Enthalpy of vaporization (kJ/mol)                  |          |        | 0.08   | 1.74    | 6.52  | 9.05  | 12.65 | 18.1 |
| Solubility in water at 20 °C (cm <sup>3</sup> /kg) |          |        | 8.61   | 10.5    | 33.6  | 59.4  | 108.1 | 230  |
| Atomic number                                      | 2        | 10     | 18     | 36      | 54    | 86    |       |      |
| Atomic radius (calculated) (pm)                    | 31       | 38     | 71     | 88      | 108   | 120   |       |      |
| Ionization energy (kJ/mol)                         |          | 2372   | 2080   | 1520    | 1351  | 1170  | 1037  |      |
| Allen electronegativity[26]                        |          | 4.16   | 4.79   | 3.24    | 2.97  | 2.58  | 2.60  |      |

## PHYSICAL PROPERTIES

- All the noble gases are monoatomic.
- They are colourless, odourless and tasteless.
- They are sparingly soluble in water
- They have very low melting and boiling points because the only type of interatomic interaction in these elements is weak dispersion forces.

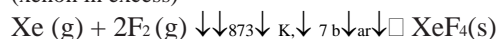
## Chemical properties

### (a) Xenon-fluorine compounds

Xenon forms three binary fluorides, XeF<sub>2</sub>, XeF<sub>4</sub> and XeF<sub>6</sub> by the direct reaction of elements under appropriate experimental conditions.



(xenon in excess)

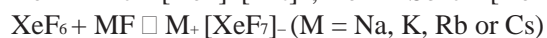
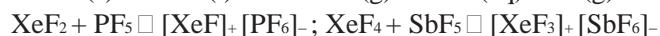
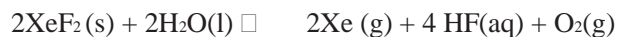


(1:5 ratio)

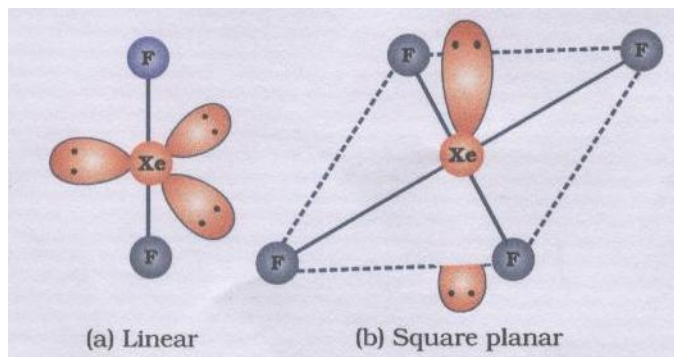
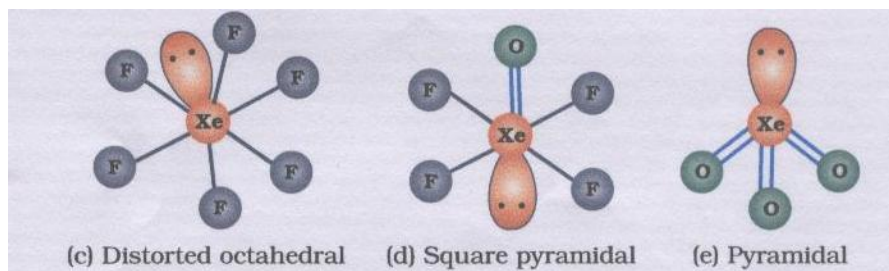


(1:20 ratio)

XeF<sub>6</sub> can also be prepared by the interaction of XeF<sub>4</sub> and O<sub>2</sub>F<sub>2</sub> at 143K.



## STRUCTURE S OF XENON COMPOUNDS:



#### USES OF NOBLE GASES:

1. Krypton is used with nitrogen in ordinary light bulbs because these gases keep the glowing light bulbs from burning out.
2. Krypton lights are used to illuminate landing strips at airports,
3. Xenon is used in strobe lights.

#### ACTIVITY-

Class was divided into groups and a discussion was done on the properties of noble metals.

#### INSTANT DIAGNOSTIC QUESTIONS-

- Q.name the elements of group 18
- Q.what are the other names of group 18 elements
- Q.why are these known as noble gases

Q.write general electronic configuration of noble metals.

#### LEVELWISE ASSIGNMENTS\_

##### LEVEL I

1. Why are noble gases not reactive?
2. Which element of noble gases is found to form compounds?
3. Which was the first noble gas compound?

##### LEVEL II

1. Why xenon forms compounds with only oxygen and fluorine?
2. What are the different oxidation states shown by noble gases?
3. Draw structures of  $\text{XeF}_2$ ,  $\text{XeF}_4$ ,  $\text{XeF}_6$ .
4. Why have noble gases larger positive values of electron gain enthalpy?

##### LEVEL III

1. What inspired N. Bartlett to form xenon oxy fluoride?
2. Draw structures of  $\text{XeO}_3$ ,  $\text{XeOF}_2$ ,  $\text{XeOF}_4$ ?
3. Why noble gases have larger radii ?
4. Why is Helium used in filling balloons for meteorological observations?

##### PROJECT

Make a list of compounds of noble gases. Also draw their structures.