## Valency and Oxidation state

**26.** (c) *Li*, *Na*, *K*, contains only one $e^-$ in outer most orbit.

**27.** (b) Valency is according to valence shall configuration which here is $1s^2, 2s^2, 2p^3, ie. 5$

**28.** (c) *Fe* belongs to first transition series.

**29.** (d) Reactivity of alkaline earth metals increases down the group.

**30.** **(b) Of inert pair effect**
This is due to the **inert pair effect**, where the **ns² electrons are less likely to participate** in bonding as the atom gets heavier.

Not because it's a transition element, amphoteric, or highly reactive.

**31.** (d) Tendency to gain $e^-$ and oxidising power are related. Among halogens $F$ is the directly most powerful oxidising agent.

**32.** (d) Electronic configuration of outermost shell of group-17 or halogens are $ns^2np^5$.

**33.** (b) On passing from left to right in a period acidic character of the normal oxides of the element goes on increasing with increase in electronegativity.

**34.** **(c) HI**
**Acid strength in water** depends on **bond strength (H–X bond)** and **electronegativity of X**.

**HF** → very strong bond → weak acid in water.
**HI, HBr, HCl** → bond strength decreases down the group → acid strength increases.
**Trend:** HF < HCl < HBr < HI

**35.** **(a) $BeCl_2$ < $MgCl_2$ < $CaCl_2$ < $BaCl_2$**

**Ionic character** decreases with **smaller cation size and higher charge density**, due to **polarizing power**.

Trend of **cations (size)**: $Be^{2+} < Mg^{2+} < Ca^{2+} < Ba^{2+}$
**Polarizing power decreases down the group**, so ionic character **increases down the group**: $BeCl_2$ (most covalent) → $BaCl_2$ (most ionic)

**36.** (b) Gold is found in native state.

**37.** (d) The elements which having same number of electrons in the valence shell are placed in the same group of periodic table.

**38.** (c) Alkali metals have the configuration $(n-1)s^2p^6, ns^1$

**39.** **(d) Metallic property**
**Oxidising property** → Decreases down the group (halogens).

**Electronegativity** → Decreases down the group.
**Acidic property** → Decreases down the group for oxides/hydrides.
**Metallic property** → Increases down the group (elements lose electrons more easily).

**40.** **Both (a) $K^+$ and (b) $Ca^2$**
18 electrons → **electronic configuration of noble gas Ar**: $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$

Check the ions:
**$K^+$** → K: $1s^2 2s^2 2p^6 3s^2 3p^6$ → 18 $e^-$
**$Ca^{2+}$** → Ca: 20 → loses 2 → 18 $e^-$
**$Na^+$** → 11 → loses 1 → 10 $e^-$
**$Cu^+$** → Cu: 29 → loses 1 → 28 $e^-$

**41.** (a) As going down the group size increases, an liberation of $H^+$ ion becomes easy. So the order of acidity is : $HI > HBr > HCl > HF$

**42.** **(d) $Zn(OH)_2$**

**NaOH, KOH, $Ca(OH)_2$** → strong bases, completely dissociate in water.

**$Zn(OH)_2$** → amphoteric, poorly soluble → weak base.

**43.** **(d) Am**
**Eu (Europium)** → commonly +2 and +3

**La (Lanthanum)** → mostly +3
**Gd (Gadolinium)** → mostly +3
**Am (Americium, actinide)** → shows multiple oxidation states (+2, +3, +4, +5, +6)

**44.** (d) Valence shell configuration for IIA group elements is : $ns^2$

**45.** (b) $A_2B_3$

$A \xrightarrow{-3e^-} A^{+3}$; $B \xrightarrow{+2e^-} B^{-2}$

**46.** **(d) F**

**Cl, Br, I** → Can show +1, +3, +5, +7 in oxides or oxyacids.

**F (Fluorine)** → Always has **-1** oxidation state because it is the **most electronegative element** and cannot have a positive oxidation state.

**47.** (b) Lower the value of I.P. of an element, the greater will be the basic character of the element.

**48.** (c) *N*, *O* and *F* have strong tendency to attract the shared pair of electrons i.e. by gaining electrons to form anions

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**49.** (c) $B_2O_3$,$Al_2O_3$are amphoteric oxides.

**50.** (d) $He$ has the atomic number 2 so it does not have octet.

**51.** (c) Beryllium has the valency of +2 while aluminum exhibits its valency as +3