Extended or long form of periodic table

91. (d) It show similarities with both alkali metals as well as halogens.

92. (b) M^- After gaining an e^- the metal attains stable configuration.

93. **(c) 18**Period 5 begins with **Rb (Z = 37)** and ends with **Xe (Z = 54)**.

Total elements = 54−37+1=1854 - 37 + 1 = 1854−37+1=18.

94. **(a) s-block**

Z=55 → **Cesium (Cs)**.

Cesium is in **Group 1 (alkali metals)**, period 6.
Group 1 elements belong to the **s-block**.

95. (d) Due to presence of vacant *d*-orbitals and they show *d*-*d* transition.

96. (d) Potassium, $K-[Ar]4s^1$.

97. (c) *p*-block; ${}_{31}Ga \rightarrow [Ar]3d^{10}4s^2p^1$.

98. (a) Strong metallic Group 14 ends with **Pb (lead)**; metallic character increases down the group → **strongly metallic**.

99. (a) Transition elements d-block elements are the **transition elements**.

100. c) Li “Normal/representative elements” = s- and p-block (excluding rare earths). **Li** fits; **Ce** is lanthanide, **He/Ar** are noble gases.

101. (c) As **As (arsenic)** is a classic metalloid; **Pb** and **Zn** are metals.

102. (c) *Mg* has only two electrons in the 3*s*-orbital and hence its I.E. is lowest, i.e. it has the maximum tendency to form di-positive ions.

103. (a,b,c,)

(a) Correct → The long form is arranged strictly on the basis of the order of filling of **s, p, d, f** sub-shells (electronic configuration).

(b) Correct → Since valency depends on outer configuration, the periodic table does help in predicting stable valencies.

c) Correct → Trends in **atomic size, ionisation energy, electronegativity, metallic character** etc. are clearly reflected.

(d) is wrong (because the modern long form is based on **atomic number**, not atomic weight).

104. (c) As last e^- goes to *d*-subshell.

105. **(d) f-block elements** Ce = Cerium, atomic number 58.

Belongs to **lanthanides**, which are in the **f-block**.

106. **(a) Number of protons in the nucleus** Atomic number (Z) = number of **protons in the nucleus** (and = number of electrons in a neutral atom).

107. (d) First decreases to a minimum and then increases

108. (a) $_{25}Mn - 3d^5 4s^2$.

109. (a) 11 and 37

Z = 11 → Na (Group 1, alkali metal)

Z = 37 → Rb (Group 1, alkali metal)

They are in the **same group**.

110. (b) Lanthanides

Filling of **4f orbitals** → Lanthanides (Z = 58–71).

111. (b) Hydrogen, forms hydrides like halides, e.g. *HCl*.

112. **(a) (i) Increase continuously; (ii) Decreases continuously**

(i) **Down a group** → atomic radius **increases continuously** (new shells added).

(ii) **Across a period (left → right)** → radius **decreases continuously** (nuclear charge increases, pulling electrons closer).

113. **(b) Similar e/r ratio of the elements**

The main cause is that elements lying diagonally in the periodic table (e.g., Li–Mg, Be–Al, B–Si) have **similar charge/radius ratio (e/r ratio)**.

This gives them comparable **polarising power, electronegativity, and chemical behaviour**.

114. (a) Hydration energy increases along the period.

115. (d) In IIA group all elements are metal while in IIIA, IVA and VIIA groups non-metallic elements are also present.

116. **(c) Rutherford**

Prout → gave the *Prout's hypothesis* (atomic weights are multiples of H), not directly the periodic table.

Newlands → Law of Octaves (periodic table contribution).
Rutherford → atomic model, not periodic table.
Lothar Meyer → worked on atomic volume curves, contributed to periodic classification.
The one **not associated** is **Rutherford**.

117. **(c) d-block**

Z = 23 → **Vanadium (V)**.

Vanadium is a **transition element**, group 5, period 4.

Transition elements = **d-block**.

118. (c) Mg, Ba, Ca have ns^2 configuration.

119. (a) Elements of group halogen are : F, Cl, Br I and At .

120. **(c) 7P + 10e**

The nitride ion is **N^{3-}**.

Normal nitrogen atom: Z = 7 → **7 protons, 7 electrons**.
As N gains 3 extra electrons → total electrons = 7 + 3 = **10 electrons**.
Protons do not change → still **7 protons**.
omposition = **7 protons + 10 electrons**

121. (d) N and P have 3 unpaired electrons in $2p$ and $3p$ respectively; V has 3 unpaired electrons in $3d$.

122. **(b) Na_2CO_3**

$MgCO_3$ → decomposes to $MgO + CO_2$.

Na_2CO_3 → **does not decompose easily on heating** (very stable alkali carbonate).
Li_2CO_3 → decomposes to $Li_2O + CO_2$.
$Ca(HCO_3)_2$ → decomposes easily to $CaCO_3 + CO_2 + H_2O$.

123. (a) **smallest** is **H_2O (104.5°)**.

H_2O → bent structure, bond angle ≈ 104.5°.

NH_3 → trigonal pyramidal, bond angle ≈ 107°.
CH_4 → tetrahedral, bond angle = 109.5°.
CO_2 → linear, bond angle = 180°.

124. (b) Tungston (W) having highest m.p.

125. (b) These atomic no. gives the configuration ns^2np^5 which are of halogen group or VII[th] group.

126. (b) The atomic no. of an element is derived from the no. of proton because during chemical reaction no. of electron undergoes for change

127. (d) Due to identical ionic radii and polarising power

$$\left[\frac{\text{Charge}}{\text{Size}}\text{ ratio of pairs of these elements}\right]$$

128. **(c) Valence electrons**

Atomic size → increases.

Density → generally increases (though irregular).
Valence electrons → remain the same within a group.
Metallic character → increases.

129. **: (b) Li**

Hg (mercury) → liquid metal at room temp.

Br (bromine) → liquid non-metal at room temp.
Ga (gallium) → melts just above room temp (~30°C).
Li (lithium) → solid metal at room temp.

130. **(d) The re-occurrence of similar outer electronic configuration** Periodicity arises from **repetition of similar outer electronic configuration** after certain intervals.

131. **(d) The ratio of their charge to size is nearly the same**

This is due to **diagonal relationship** → similar **charge/radius ratio (polarising power)**.

Textbook explanation: “The ratio of their charge to size is nearly the same.”