

CCT Weekly Practice (Science)

UNIT - Periodic trends in atomic properties

Group→	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
↓ Period																		
1	1 H																	2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
5	37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
6	55 Cs	56 Ba		72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
7	87 Fr	88 Ra		104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Uut	114 Fl	115 Uup	116 Lv	117 Uus	118 Uuo
Lanthanides			57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu	
Actinides			89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr	

The periodic table is an important tool in the study of chemistry. It describes the atomic properties of every known chemical element in a concise format, including the atomic number, atomic mass and relationships between the elements. The periodic table has undergone extensive changes in the time since it was originally developed by Mendeleev and Moseley. Many new elements have been discovered, while others have been artificially synthesized. Each fits properly into the same vertical column or group. From left to right across each period, metallic character gives way to non-metallic character. The elements with more metallic character are at the lower left part of the periodic table near Caesium. The elements with more non-metallic character are at the upper right portion of the periodic table near Fluorine. The bold line of the periodic table that begins at boron and moves down like a staircase to astatine (At) roughly separates the metals and the non- metals.

Atomic radii show periodicity with the atomic number. Atoms get larger from top to bottom of a group. Atomic radii decrease across a period from left to right. We can also use the trends in the size of atomic radii to predict trends in the reactivity.

Question 1:- Which element in each pair is more reactive:

- i) O or S
- ii) Be or Ca
- iii) Na or Mg
- iv) Li or Rb
- a) O, Ca, Na, Rb
- b) S, Ca, Mg, Li
- c) O, Be, Mg, Rb
- d) S, Ca, Na, Li

Question2:- W, X, Y and Z are elements in the same period in the periodic table. W and Y are metals. X and Z are non – metals. Which of the following shows the correct order of these elements across the period?

a	X	Z			W			Y
b	W		X		Y		Z	
c	Y					W	X	Z
d	W		Y			X	Z	

Question3:- The table given below contains atoms of few elements with their atomic radii. When these elements are arranged in a specific manner, their valency first increases and then decreases.

Atoms	P	Q	R	S	T
Atomic radii	160	186	104	99	117

Identify correct order of their increasing atomic number:

- a) $P < Q < R < T < S$
- b) $S < Q < P < T < R$
- c) $Q < P < T < R < S$
- d) $P < R < T < S < Q$

Question4:- The energy required to pull the most loosely bound electron from an atom is known as ionization energy. The value of ionization energy depends on three factors:

- (i) the charge on the nucleus
- (ii) the atomic radius and

(iii) the screening effect of inner electron shells.

Which of the following elements has the least ionization energy?

- a) Lithium
- b) Caesium
- c) Magnesium
- d) Calcium

Question5:- All the metals of group 1 react with water, liberating hydrogen gas and forming metal hydroxides. Suppose you are provided with a piece of metal stored in a bottle labelled as 'Rubidium'. Based on your knowledge of the periodic table explain why it is not safe to dispose it in sink with water?

Answers:

1. a) O, Ca, Na, Rb
2. d) D
3. c) $Q < P < T < R < S$
4. b) Caesium
5. Rubidium reacts very violently and immediately with water. The reaction is highly exothermic. Rubidium hydroxide and hydrogen gas are formed. The group 1 metals become more reactive towards water as we go down the group.

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