Class 11 Chemistry · Chapter 2: Structure of Atom

Worksheet · 20 marks · about 40 minutes · based on NCERT

Name _____ Class and section _____ Date _____

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1. Light of wavelength 480 nm (photon energy 2.59 eV) falls in turn on Li, Na, K, Mg, Cu and Ag, whose work functions are given in Table 2.2 of NCERT (Li 2.42, Na 2.3, K 2.25, Mg 3.7, Cu 4.8, Ag 4.3 eV). Photoelectrons are ejected from [1]

(a) all six metals
(b) K only
(c) Mg, Cu and Ag only
(d) Li, Na and K only

2. Which species has as many neutrons as $^{23}_{11}Na^{+}$ has electrons? [1]

(a) $^{19}_{9}F^{-}$
(b) $^{16}_{8}O$
(c) $^{24}_{12}Mg^{2+}$
(d) $^{14}_{7}N$

3. Which pair of atoms are isobars? [1]

(a) $^{35}_{17}Cl$ and $^{37}_{17}Cl$
(b) $^{14}_{6}C$ and $^{16}_{8}O$
(c) $^{12}_{6}C$ and $^{13}_{6}C$
(d) $^{40}_{18}Ar$ and $^{40}_{20}Ca$

4. In a discharge tube the gas is changed from hydrogen to neon, everything else kept the same. Which of these changes? [1]

(a) the charge to mass ratio of the cathode rays
(b) the charge to mass ratio of the canal rays
(c) the direction in which cathode rays travel
(d) the sign of the charge on the cathode rays

5. An absorption line in a spectrum is recorded at a wavenumber of 2000 cm^{-1}. Its wavelength is [1]

(a) 50 µm
(b) 0.50 µm
(c) 5.0 µm
(d) 20 µm

6. State Hund's rule of maximum multiplicity. Using it, draw the orbital diagrams of the 2p electrons of nitrogen and oxygen and say how many unpaired electrons each has. [2]

7. Give two reasons why the Bohr model of the atom is not acceptable in the light of de Broglie's and Heisenberg's ideas. [2]

8. An iron rod heated in a furnace glows dull red, then brighter red, and at very high temperature white and then bluish. Explain this using the way the radiation of a hot body depends on temperature. [2]

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9. The position of chromium (Z = 24) suggests the configuration $[Ar]3d^4 4s^2$, but its ground state is $[Ar]3d^5 4s^1$. Give two reasons for this, and state the number of unpaired electrons in a chromium atom. [3]

10. What did Thomson's model of the atom lead Rutherford to expect when α-particles were fired at a thin gold foil? State what was actually observed, and the conclusion drawn from each observation. [3]

11. Chlorine molecules split into atoms when they absorb light, which is how the reaction of chlorine with methane starts in sunlight. Breaking one mole of Cl–Cl bonds needs 242 kJ (given). (i) Calculate the energy of one mole of photons of wavelength 400 nm, in kJ mol^{-1}. (ii) Can these photons break Cl–Cl bonds, and how much energy per mole of photons is left over? (iii) Can the 589 nm light of a sodium lamp break the bonds? ($h = 6.626 \times 10^{-34}$ J s, $c = 3.0 \times 10^8$ m s^{-1}, $N_A = 6.022 \times 10^{23}$ mol^{-1}) [3]

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