STRUCTURE OF ATOMS

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Sr. #	Questions	A	B	C	D
1 (b) (2016)	Which one the following results in the discovery of protons: ان میں سے کس کے نتیجے میں پروٹون کی دریافت ہوئی؟	Cathode rays کیتھوڈ ریز	Canal rays کینال ریز	X-rays ایکس ریز	Alpha rays الفا ریز
2 (c)	Which one of the following is the most penetrating? ان میں سے کون سے پارٹیکلز مادے میں سب سے زیادہ سرائیت کرنے والے ہیں؟	Protons پروٹونز	Electrons الیکٹرونز	Neutrons نیوٹرونز	Alpha particles الفا پارٹیکلز
3 (c)	The concept of orbit was used by: ایٹم کے آربٹ کا تصور کس نے پیش کیا:	J.J Thomson جے جے تھامسن	Rutherford ردر فورڈ	Bohr بوہر	Planck پلانکس
4 (d) (2017) (2018) (2019)	Which one the following shell consist of three subshells. ان میں سے کونسا شیل تین سب شیل پر مُشتمل ہے؟	O shell O شیل	N shell N شیل	L shell L شیل	M shell M شیل
5 (a) (2016)	Which radioisotope is used for the diagnosis of tumor in the body? کون سا ریڈیو آئسوٹوپ جسم میں ٹیومر کی تشخیص کے لیے استعمال کیا جاتا ہے؟	Cobalt-60 کوبالٹ-60	Iodine-131 آیوڈین-131	Strontium-90 سٹرونشیم-90	Phosphorus-32 فاسفورس-32
نوٹ: آیوڈین اور کوبالٹ دونوں ہی ٹیومر کی تشخیص (Diagnosis) کے لیے استعمال ہوتے ہیں۔ لیکن آیوڈین صرف گوئٹر کی تشخیص diagnosis کے لیے استعمال ہوتا ہے۔ جبکہ کوبالٹ کسی بھی قسم کے ٹیومر کی تشخیص diagnosis کے لیے استعمال ہوتا ہے۔					
6 (b)	When U-235 breaks up, it produces: جب یورینیم-235 ٹوٹتا ہے تو اس سے پیدا ہوتے ہیں؟	Electrons الیکٹرونز	Neutrons نیوٹرونز	Protons پروٹونز	Nothing کچھ بھی نہیں
7 (c) (2021)	The p subshell has: p سب شیل مشتمل ہے۔	One orbital ایک آربیٹل پر	Two orbitals دو آربیٹل پر	Three orbitals تین آربیٹل پر	Four orbitals چار آربیٹل پر

نوٹ: کسی بھی سب شیل میں جتنے الیکٹران آتے ہیں۔ اسے 2 سے تقسیم (Divide) کرنے سے اُس سب شیل میں موجود ٹوٹل آربیٹلز کا پتا لگایا جا سکتا ہے۔ جیسے p سب شیل میں 6 الیکٹران آسکتے ہیں، اسے 2 سے تقسیم (Divide) کرنے سے جواب 3 آتا ہے۔ مطلب اس میں 3 آربیٹل ہیں۔					
8 (b) (2016) (2023)	Deuterium is used to make: ڈیوٹریم ان میں سے کیا بنانے کے لیے استعمال ہوتا ہے؟	Light water لائٹ واٹر	Heavy water ہیوی واٹر	Soft water سوفٹ واٹر	Hard water ہارڈ واٹر
9 (d)	The isotope C-12 is present in abundance of:	96.9%	97.6%	99.7%	None of these
9.1 (c) (2019)	آئسوٹوپ C-12 کتنی مقدار میں پایا جاتا ہے؟ (9th کی اُردو کی کتاب کے مطابق آپشنز (Options) یہ ہیں)	96.9%	97.6%	98.9%	99.7%
10 (a) (2017)	Who discovered the proton? درج ذیل سائنسدانوں میں سے کس نے پروٹون دریافت کیے؟	Goldstein گولڈ سٹائن	J.J Thomson جے جے تھامسن	Neil's Bohr نیل بوہر	Rutherford ردر فورڈ
MCQs of previous all Punjab Board papers					
11 (c) (2012)	How many isotopes of oxygen exist? آکسیجن کے کتنے آئسوٹوپس پائے جاتے ہیں؟	2	4	3	5
12 (c) (2012)	If n = 4 than how many electrons can be accommodated in its shells? اگر n = 4 ہو تو اس کے شیلز میں کتنے الیکٹران آسکتے ہیں؟	18	16	32	64
13 (c) (2015)	p subshell can accommodate electrons? p سب شیل میں کتنے الیکٹران آسکتے ہیں؟	2	4	6	8
14 (b) (2015)	Number of neutrons of potassium is: پوٹاشیم میں نیوٹرنز کی تعداد ہے:	19	20	39	18
15 (b) (2015)	Who is the Father of Nuclear Sciences? نیوکلیئر سائنس کا باپ کون ہے:	Neil Bohr نیل بوہر	Rutherford ردر فورڈ	Max Planck میکس پلانکس	J.J Thomson جے جے تھامسن
16 (b) (2014)	"N" shell can accommodate electrons: N شیل میں کتنے الیکٹران آسکتے ہیں؟	18	32	8	2
17 (b) (2015)	Electronic configuration of Nitrogen is: نائٹروجن کی الیکٹرونک کنفگریشن ہے۔	$1s^2, 2s^2, 2p^2$	$1s^2, 2s^2, 2p^3$	$1s^2, 2s^2, 2p^4$	$1s^2, 2s^2, 2p^5$
18 (b) (2014)	"M" shell can accommodate maximum number of electrons: M شیل میں زیادہ سے زیادہ الیکٹران آسکتے ہیں؟	32	18	8	2

19 (c) (2018)	Charge on neutron is: نیوٹران پر چارج ہوتا ہے	Negative منفی	Positive مثبت	No کوئی نہیں	Partial positive جزوی مثبت
20 (b) (2018)	Who discovered the electron? درج ذیل سائنسدانوں میں سے کس نے الیکٹرون دریافت کیے؟	Goldstein گولڈ سٹائن	J.J Thomson جے جے تھامسن	Neil's Bohr نیل بوہر	Rutherford ردر فورڈ
21 (c) (2021)	"L" shell can accommodate electrons: L شیل میں کتنے الیکٹران آسکتے ہیں؟	18	32	8	2
22 (b) (2022)	Number of neutrons in deuterium $^{2}_{1}H$ isotope is ڈیوٹیریم آئسوٹوپ میں نیوٹرنز کی تعداد ہے:	Zero صفر	One ایک	Two دو	Three تین
23 (d) (2022)	Almost all the particles passed through the foil undeflected. This observation was made by: تقریباً تمام الفاپارٹیکلز ورق میں سے بغیر راستہ تبدیل گزر گئے۔ یہ مشاہدہ ہے:	Dalton ڈالٹن	J.J Thomson جے جے تھامسن	Bohr بوہر	Rutherford ردر فورڈ
24 (c) (2023)	M shell consists of no of subshells. M شیل کتنے سب شیل پر مُشتمل ہوتا ہے؟	1	2	3	4

1. Give two characteristics of cathode rays. (Also A long Question).

- They cast a sharp shadow of an opaque (غیر شفاف) object placed in their path.
- They are deflected (مُڑ جانا) towards positive plate in an electric filed.
- They raise the temperature of the body on which they fall.
- They travel in a straight line.

2. Write down any two properties of neutrons. (Also A long Question).

Neutrons has following properties

- Neutrons carry no charge i.e. they are neutral.
- They are highly penetrating.
- Their mass is nearly equal to mass of proton.
- They show no deflection in electric or magnetic field.

3. Give two properties of positive rays. (Also A long Question).

- They travel in a straight line opposite to the direction of cathode rays.
- The nature of these rays depends upon the nature of gas present in discharge tube.
- They show deflection in electric and magnetic field.
- For hydrogen atom, Mass of these particles was found equal to that of proton.

4. For what purpose U-235 is used?

U-235 is used to get large amount of energy by controlled nuclear fission process in nuclear reactors. This energy can be used to generate electricity.

5. A patient has goiter (گلہڑ). How will it be detected?

OR

For what purpose Iodine-131 is used?

Iodine-131 is used to detect or diagnose (تشخیص کرنا) the goiter in thyroid gland.

6. What are the defects of Rutherford's atomic model?

Following are the defects in the Rutherford's atomic model.

- Electron being the charged particle should release energy continuously and ultimately fall into nucleus.
- If the electrons emit energy continuously, they should form a continuous spectrum, but they form line spectrum.

7. Write two observations of Rutherford atomic model.

- Almost all the particles passed through the foil undeflected.
- Out of 20,000 particles, only a few were deflected at fairly large angles and very few bounced back on hitting the gold foil.

8. Write down two postulates of Bohr's atomic theory. (Also A long Question).

- The hydrogen atom consist of a tiny nucleus and electrons are revolving in one of circular orbits having radius "r".
- Each orbit has a fixed energy that is quantized.
- Electrons can revolve only in those orbits which have fix angular momentum (mvr) i.e. mvr = n $\frac{h}{2\pi}$
- When an electron changes its shell, energy is absorbed or released.

9. Define term carbon dating.

"The method of age determination (معلوم کرنا) of old carbon containing objects (fossils) by measuring the radioactivity of C-14 in them is called carbon dating or radio-carbon dating".

10. Define electronic configuration.

OR

What is meant by electronic configuration?

It can be defined as "The distribution of electrons around the nucleus in different shells and subshells according to their increasing energy is called electronic configuration".

11. How many electrons are present in K, L, M and N shells of the atom?

Number of electrons in K shell	= 2	Number of electrons in L shell	= 8
Number of electrons in M shell	= 18	Number of electrons in N shell	= 32

12. How many electrons are present in s, p, d and f subshells of the atom?

Number of electrons in **s** subshell	= 2	Number of electrons in **p** subshell	= 6
Number of electrons in **d** subshell	= 10	Number of electrons in **f** subshell	= 14

13. Write the electronic configuration of Hydrogen, boron, nitrogen, oxygen, sodium, aluminium, Al^{3+} ion, Cl^- ion and phosphorus?

The electronic configuration of **hydrogen** is **$1s^1$.**

The atomic number of Boron is 5 so it have 5 electrons.

Electronic configuration of **boron** is **$1s^2, 2s^2, 2p^1$**

The atomic number of Nitrogen is 7 so it have 7 electrons.

Electronic configuration of **Nitrogen** is **$1s^2, 2s^2, 2p^3$**

The atomic number of Oxygen is 8 so it have 8 electrons.

Electronic configuration of **Oxygen** is **$1s^2, 2s^2, 2p^4$**

The atomic number of Sodium is 11 so it have 11 electrons.

Electronic configuration of **sodium** is **$1s^2, 2s^2, 2p^6, 3s^1$**

The atomic number of Aluminium is 13 so it have 13 electrons.

Electronic configuration of **aluminium** is **$1s^2, 2s^2, 2p^6, 3s^2, 3p^1$**

When **Al^{3+} ion** is formed, it loses 3 electrons, now number of electrons are 10.

Electronic configuration of **Al^{3+} ion** is **$1s^2, 2s^2, 2p^6$**

The atomic number of phosphorus is 15 so it have 15 electrons.

Electronic configuration **phosphorus** is **$1s^2, 2s^2, 2p^6, 3s^2, 3p^3$**

When **P^{-3} ion** is formed, it gains 3 electrons, now number of electrons are 18.

Electronic configuration **P^{-3} ion** is **$1s^2, 2s^2, 2p^6, 3s^2, 3p^6$**

The atomic number of **Cl** is17 so it have 17 electrons

Electronic configuration **Cl** is **$1s^2, 2s^2, 2p^6, 3s^2, 3p^5$**

When **Cl^- ion** is formed, it gains 1 electron, now number of electrons are 18.

Electronic configuration **Cl^{--} ion** is **$1s^2, 2s^2, 2p^6, 3s^2, 3p^6$**

14. Write down two isotopes of followings:
Hydrogen, Chlorine, Uranium Oxygen, and Carbon.
There are following isotopes of Chlorine Uranium Oxygen and Carbon.

$$^{35}_{17}Cl \quad ^{37}_{17}Cl \quad , \quad ^{234}_{92}U \quad ^{235}_{92}U \quad ^{238}_{92}U \quad ^{16}_{8}O \quad ^{17}_{8}O \quad ^{18}_{8}O \quad ^{12}_{6}C \quad ^{13}_{6}C \quad ^{14}_{6}C$$

Isotopes of hydrogen.

Protium ($^{1}_{1}H$) Deuterium ($^{2}_{1}H$) Tritium ($^{3}_{1}H$)

LONG QUESTIONS

I. **Describe the result of the experiments of Rutherford.**

II. **Write down postulates of Bohr's atomic theory.** (جواب اوپر مختصر سوالوں کے ساتھ دیا گیا ہے)

III. **Write properties of cathode rays.** (جواب اوپر مختصر سوالوں کے ساتھ دیا گیا ہے)

IV. Discuss uses of isotopes in detail.

V. **Give any two differences between Rutherford's atomic theory and Bohr's atomic theory.**
Differences between Rutherford's atomic theory and Bohr's atomic theory are given following.

Sr. No	Rutherford's Atomic Theory	Bohr's Atomic Theory
1	It was based upon classical theory.	It was based upon quantum theory.
2	No idea about orbit was introduced.	Orbits had angular momentum.
3	Atom should produce continuous spectrum.	Atom should produce line spectrum.
4	Atoms should collapse.	Atoms should exist.