

Atomic Structure Homework Answers

1. Oxygen has three isotopes; each is listed in the table below. Complete the gaps in the table.

Isotope	$^{16}_8\text{O}$		$^{18}_8\text{O}$
Number of electrons		8	
Number of protons	8		
Number of neutrons		9	10

2. An atom contains 16 protons, 18 neutrons and 16 electrons?
- What is its mass number?
 - Name the element of which this is an isotope.
3. ^1_1H and ^3_1H are isotopes of the element Hydrogen.
- Define the term isotope
 - Name these two isotopes
 - Describe how these two isotopes differ.
 - Explain how the isotopes of hydrogen have the same chemical properties, yet differ in their physical properties.
 - Give an example of another element which has isotopes not mentioned in this homework activity.
4. Isotopes have a variety of uses. Describe two of these uses below for two named isotopes

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Number of protons	8	8	8
Number of neutrons	8	9	10

2. An atom contains 16 protons, 18 neutrons and 16 electrons?

- a. What is its mass number?

Mass number = $16+18 = 34$

- b. Name the element of which this is an isotope.

Sulfur

3. ^1_1H and ^3_1H are isotopes of the element Hydrogen.

- a. Define the term isotope

Isotopes are atoms of an element which have the same number of protons/atomic number but differ in the number of neutrons/have a different atomic mass.

- b. Name these two isotopes

Protium and tritium

- c. Describe how these two isotopes differ.

Protium (^1_1H) has no neutrons in its nucleus, while tritium (^3_1H) has 2 neutrons.

- d. Explain how the isotopes of hydrogen have the same chemical properties, yet differ in their physical properties.

Chemical properties are determined by the number of electrons an atom has. Both isotopes have one electron, therefore they will have similar chemical properties. Tritium has 2 extra neutrons therefore it will have a greater mass, which is a physical property.

- e. Give an example of another element which has isotopes not mentioned in this homework activity.

Carbon has three isotopes – C-12, C-13 and C-14

Chlorine has two isotopes – Cl-35 and Cl-37

Lithium has two isotopes – Li-6 and Li-7

Name: _____ Period: _____ Due Date: _____

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4. Isotopes have a variety of uses. Describe two of these uses below for two named isotopes.

Medical:

Cobalt-60 used to in radiotherapy for the treatment of cancer.

Fluorine-18 is used in medical imaging/PET scans

Dating:

Carbon-14 – predicting the age of organisms/ prehistoric artefacts up to 50,000 years old.

Potassium -40 decays to Argon-40 which can be used to date rocks which are up to 4 billion years old.

Industry:

Sodium-24 is used to detect leaks in pipelines

Uranium-235 is used in nuclear power plants and nuclear reactors for submarines.