Name : _____   Date : _____

Isotopes and Atomic Masses Worksheet

Answer the following questions.

1) Determine the average atomic mass of hafnium (Hf) if, out of every 100 atoms, weigh 176, 19 weigh 177, 27 weigh 178, 14 weigh 179, and 35 weigh 180?

2) Rubidium (Rb) has two common isotopes, ^{85}Rb and ^{87}Rb. If the abundance of ^{85}Rb is 80.2% and the abundance of ^{87}Rb is 19.8%, what is the average atomic mass of Rb?

3) Titanium (Ti) has five common isotopes: ^{46}Ti (8.0%), ^{47}Ti (7.8%), ^{48}Ti (73.4%), ^{49}Ti (5.5%), ^{50}Ti (5.3%). What is the average atomic mass of titanium?

4) Calculate the average atomic mass of chlorine (Cl), considering that the element has two naturally occurring isotopes - ^{35}Cl at an abundance of 75.53% and ^{37}Cl at an abundance of 24.47%.

5) Calculate the atomic mass of copper (Cu) if ^{63}Cu is 69.17% abundant and ^{65}Cu is 30.83% abundant.

6) Calculate the atomic mass of carbon (C) if ^{12}C is 98% abundant and ^{14}C is 2% abundant.

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Answers

1) Determine the average atomic mass of hafnium (Hf) if, out of every 100 atoms, weigh 176, 19 weigh 177, 27 weigh 178, 14 weigh 179, and 35 weigh 180?

Average atomic mass of Hf = (176 x 0.05) + (177 x 0.19) + (178 x 0.27) + (179 x 0.14) + (180 x 0.35) = 8.8 + 33.63 + 48.06 + 25.06 + 63 = 178.55 amu

2) Rubidium (Rb) has two common isotopes, ^{85}Rb and ^{87}Rb. If the abundance of ^{85}Rb is 80.2% and the abundance of ^{87}Rb is 19.8%, what is the average atomic mass of Rb?

Average atomic mass of Rb = (85 x 0.802) + (87 x 0.198) = 68.17 + 17.226 = 85.396 amu

3) Titanium (Ti) has five common isotopes: ^{46}Ti (8.0%), ^{47}Ti (7.8%), ^{48}Ti (73.4%), ^{49}Ti (5.5%), ^{50}Ti (5.3%). What is the average atomic mass of titanium?

Average atomic mass of Ti = (46 x 0.08) + (47 x 0.078) + (48 x 0.734) + (49 x 0.055) + (50 x 0.053) = 3.68 + 3.666 + 35.232 + 2.695 + 2.65 = 47.923 amu

4) Calculate the average atomic mass of chlorine (Cl), considering that the element has two naturally occurring isotopes - ^{35}Cl at an abundance of 75.53% and ^{37}Cl at an abundance of 24.47%.

Average atomic mass of Cl = (35 x 0.7553) + (37 x 0.2447) = 26.4355 + 9.0539 = 35.4894 amu

5) Calculate the atomic mass of copper (Cu) if ^{63}Cu is 69.17% abundant and ^{65}Cu is 30.83% abundant.

Average atomic mass of Cu = (63 x 0.6917) + (65 x 0.3083) = 43.5771 + 20.0395 = 63.6166 amu

6) Calculate the atomic mass of carbon (C) if ^{12}C is 98% abundant and ^{14}C is 2% abundant.

Average atomic mass of C = (12 x 0.98) + (14 x 0.02) = 11.76 + 0.28 = 12.04 amu