

CHAPTER 5 BLM ANSWER KEY

BLM 5-1: Subatomic Particles and Isotopes/Skill Builder

Symbol	Mass Number	Atomic Number	Number of Protons	Number of Electrons	Number of Neutrons	Atomic Mass (u)
H-1	1	1	1	1	0	1.01
H-2	2	1	1	1	1	2.02
H-3	3	1	1	1	2	3.03
B-10	10	5	5	5	5	10.08
B-11	11	5	5	5	6	11.09
N-14	14	7	7	7	7	14.12
O-16	16	8	8	8	8	16.13
F-19	19	10	10	10	9	19.16
Cl-35	35	17	17	17	18	35.29
Cl-37	37	17	17	17	20	37.31

BLM 5-2: Rubber Stopper Isotopes/Skill Builder

Answers

- 82.00 g
- 124.4 g
- 219.5 g
- 425.9 g
- 20
- 21.29 g
- The calculation does not reflect the unequal proportions of the isotopes.
- The numbers of atoms in any real sample would be immense.

BLM 5-3: Weighted Averages and Isotopes/Skill Builder

$$\text{Total Mass of B-10} = (19.78)(10.01) = 198.00 \text{ u}$$

$$\text{Total Mass of B-11} = (80.22)(11.01) = 883.22 \text{ u}$$

$$\text{Average Atomic Mass} = \frac{\text{Total Mass B-10} + \text{Total Mass of B-11}}{100}$$

$$\text{Average Atomic Mass} = \frac{198.00 \text{ u} + 883.22 \text{ u}}{100}$$

$$\text{Average Atomic Mass} = 10.81 \text{ u}$$

BLM 5-6: Formula Manipulation/Skill Builder

Answers

- $M = DV$
- $N = nN_A$
- $R = \frac{P}{I^2}$
- $V_2 = \frac{P_1 V_1}{P_2}$

BLM 5-7: Molar Mass/Problem Solving

Answers

Substance	Mass of One Entity (include type of entity)	Mass of $(6.02)(10^{23})$ Entities i.e., molar mass
Ne	atomic mass, 20.18 u	molar mass, 20.18 g
Mg	atomic mass, 24.31 u	molar mass, 24.31 g
O ₃	molecular mass, 48.00 u	molar mass, 48.00 g
C ₆ H ₁₂ O ₆	molecular mass, 180.18 u	molar mass, 180.18 g
NaCl (ionic)	formula mass, 58.44 u	molar mass, 58.44 g
KClO ₃ (ionic)	formula mass, 122.55 u	molar mass, 122.55 g
Pb	atomic mass, 207.20 u	molar mass, 207.20 g
NH ₃	molecular mass, 17.04 u	molar mass, 17.04 g
LiBr (ionic)	formula mass, 86.84 u	molar mass, 86.84 g

BLM 5-8: The Mole Box/Skill Builder

Answers

CO _(g) 1 mole $(6.02)(10^{23})$ molecules 28.01 g 22.4 L at STP	O _{3(g)} 1 mole $(6.02)(10^{23})$ molecules 48.00 g 22.4 L at STP
W _(s) 1 mole $(6.02)(10^{23})$ atoms 183.84 g	Rb ₂ O _(s) 1 mole $(6.02)(10^{23})$ formula units 186.94 g
SF _{6(g)} 1 mole $(6.02)(10^{23})$ molecules 146.07 g 22.4 L at STP	NaOH _(s) 1 mole $(6.02)(10^{23})$ formula units 40.00 g
HNO _{3(l)} 1 mole $(6.02)(10^{23})$ molecules 63.02 g	CCl _{4(l)} 1 mole $(6.02)(10^{23})$ molecules 153.81 g

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BLM 5-9: Chapter 5 Test/Assessment

Answers

- Atoms are ionized and sent along straight paths. A magnetic field deflects the ions, with lighter ions being deflected more and thus separated. The amount of electric current detected for each isotope gives a measure of relative abundance.
- Let aam represent the average atomic mass.
 $aam = [4.3(49.95) + 83.7(51.94) + 9.6(52.94) + 2.4(53.94)] \div 100$
 $aam = [214.785 + 4347.378 + 508.224 + 129.456]u \div 100 = 51.99 \text{ u} = 52.0 \text{ u}$
- $N = (8.43)(10^{25})$ atoms
 $N_A = (6.02)(10^{23})$ atoms/mol; $n = ?$; $n = N \div N_A$
 $(8.43)(10^{25}) \div (6.02)(10^{23}) \text{ mol} = 140 \text{ mol}$
There are 140 moles of platinum in the sample.
- $(\text{NH}_4)_2\text{S}$:
 $M = 2[14.01 + 4(1.01)] + 32.07 = 68.17 \text{ g/mol}$
The molar mass is 68.17 g/mol.
- One mole of water can be described as $(6.02)(10^{23})$ molecules of water or 18.02 g of water.
- $m = ?$; $n = 3.71 \text{ mol}$
 NH_3 : $M = 14.01 + 3(1.01) = 17.04 \text{ g/mol}$
 $n = m \div M$ rearranges to $m = (n)(M)$ so
 $m = (3.71)(17.04) \text{ g} = 63.2 \text{ g}$
The mass of 3.71 moles of ammonia is 63.2 g.
- Sample = x molecules = 5.00 g
Mole = $(6.02)(10^{23})$ molecules = 180.18 g
 $x \div (6.02)(10^{23}) = 5.00 / 180.18$
 $x = (1.67)(10^{22})$
There are $(1.67)(10^{22})$ molecules in a spoonful of sugar.
- A mole is an amount of substance having as many entities as there are atoms in 12 g of carbon-12. This definition means a mole always has the same number of entities and allows us to use the numerical values of the atomic masses in the Periodic Table for determining molar masses.
- (a) 3 moles
(b) 5 moles
(c) $5(6.02)(10^{23})$ atoms = $(3.01)(10^{24})$ atoms