Counting Particles with Moles

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

Use 6.02×10^{23} particles per mole for these exercises. Specify which particle a mole counts.

1 How many CO_2 molecules are in 0.500 mol of CO_2?

(1) 1.20×10^{23}
(2) 3.01×10^{23}
(3) 6.02×10^{23}
(4) 1.20×10^{24}

2 A sample contains 1.204×10^{24} helium atoms. Find the amount of helium in moles. [1]

Answer and work

_____

_____

3 What kind of entity does one mole of solid sodium chloride count?

(1) Individual Na atoms only
(2) Individual Cl atoms only
(3) NaCl molecules
(4) NaCl formula units

4 Explain why one mole of O_2 molecules contains two moles of O atoms. [1]

Answer and work

_____

_____

Comparing Pure Samples

Use the information below to answer the questions.

A class prepares the amounts shown. Count the formula unit for the ionic solid and the molecule for the gases.

Sample	Substance	Amount (mol)
P	CO_2 gas	0.250
Q	O_2 gas	0.250
R	NaCl solid	0.500

5 Which pair contains equal numbers of molecules?

(1) P and Q

(2) P and R

(3) Q and R

(4) All three samples

6 Calculate the number of oxygen atoms in sample P. Show how the formula affects the count. [1]

Answer and work

7 How does the number of NaCl formula units in R compare with the number of CO_2 molecules in P?

(1) Half as many

(2) The same number

(3) Twice as many

(4) Four times as many

8 Compare the number of chloride ions in sample R with the number of NaCl formula units in the same sample. Explain using the formula. [1]

Answer and work