Covalent Bonding and Shared Electrons

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Show your work for written answers.

A line joining two element symbols represents one shared electron pair in these bond models.

1 Which description represents a single covalent bond between two atoms?

(1) A pair of electrons shared between the atoms

(2) Two protons transferred between the nuclei

(3) One electron taken completely from each atom

(4) Two neutrons shared between the atoms

2 Use shared electrons to explain how each hydrogen atom in H–H has a filled first energy level in the bonding model. [1]

Answer and work

3 How many electrons are represented by the two lines in O=O?

(1) 1

(2) 2

(3) 4

(4) 8

4 Water has the model H–O–H. Each line represents a shared pair. Where are the two remaining valence-electron pairs on oxygen located in a Lewis model? [1]

Answer and work

Diatomic Model Labels

Use the information below to answer the questions.

A science exhibit labels three diatomic models. For this table, single, double, and triple describe the number of shared pairs between the same two atoms.

Model	Bond type	Unshared pairs per atom
H–H	Single	0
O=O	Double	2
N≡N	Triple	1

5 Which model contains the greatest number of shared electrons between its atoms?

(1) H–H

(2) O=O

(3) N≡N

(4) All three are equal.

6 Calculate the total number of valence electrons represented in the oxygen model, including shared and unshared electrons. Show the count. [1]

Answer and work

7 What formula represents the nitrogen model?

(1) N

(2) N_2

(3) N_3

(4) N_6

8 An exhibit label says the nitrogen model has six shared electrons and two unshared electrons in the whole molecule. Use the table to identify and correct the error. [1]

Answer and work