Checking an Oxygen Bond After Electrons Enter

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A classroom display compares three particles that each contain two oxygen atoms. The models differ in how many electrons the pair contains. The display gives rounded bond lengths and marks a lower bond order as a weaker link between the atoms.

Particle	**Extra electrons relative to neutral O_2**	**Model O–O length (pm)**	**Model bond order**
O_2	0	121	2
O_2^-	1	133	1.5
O_2^{2-}	2	149	1

1 Which model has the longest O–O bond?

(1) O_2 only

(2) O_2^- only

(3) O_2^{2-} only

(4) All are the same.

2 Explain what changes and what stays the same when one electron is added to neutral O_2 in this model. [1]

Answer and work

A detector reports 149 pm for a particle in the display, but another readout assigns it just one extra electron. Assume the particle must fit one row of the table.

3 Explain why the two readouts cannot both identify the same row. [1]

Answer and work

4 Draw neutral O_2 and O_2^{2-} using lines for their bonds. Label the net charge of each whole particle. [1]

Draw both particles