

Solutions

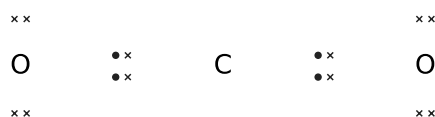
Original guidance. Accept consistent swapped dot/cross conventions and equivalent complete diagrams.

2.1



NaCl: bracketed ions; only each ion's outer shell shown.

CO₂: dots from C; crosses from O



Two shared pairs per C–O bond; two lone pairs per O.

Award Na⁺ and Cl[−] charges/brackets, eight outer electrons on each ion, and chloride's gained electron distinguished from its seven original outer electrons. Only the upper panel answers this item.

2.2



NaCl: bracketed ions; only each ion's outer shell shown.

CO₂: dots from C; crosses from O



Two shared pairs per C–O bond; two lone pairs per O.

N_2 : dots from left N; crosses from right N

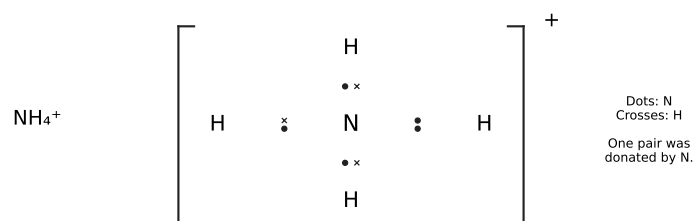


Three shared pairs and one lone pair per atom: ten outer electrons.

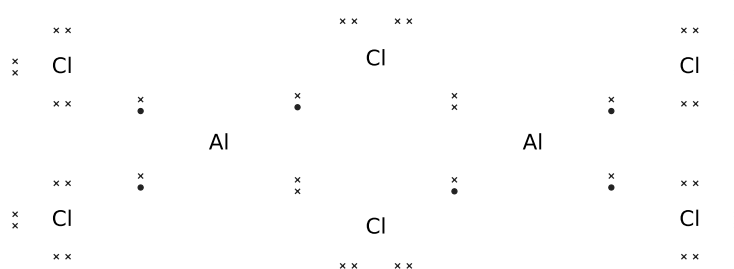
CO_2 : two shared pairs per C–O bond and two lone pairs on each O, consistent electron origins. N_2 : three shared pairs, one lone pair per N with consistent electron origins.

2.3 The migration supports the presence of mobile positively charged particles attracted to the negative electrode. Solid ionic lattices hold ions in fixed positions; solution permits movement. Metals and graphite can also conduct through mobile electrons, so conductivity alone does not identify the charge carriers or uniquely prove ionic bonding.

3.1



Al_2Cl_6 : dots from Al; crosses from Cl



Each bridging Cl donates a pair to the other Al. All 48 outer electrons are shown.

NH_4^+ : four shared pairs/no N lone pair, one pair supplied entirely by N, bracket/+ and eight-electron total. Al_2Cl_6 : two bridging chlorines, one donor pair from each bridge to the other aluminium, all terminal/bridge lone pairs and 48-electron total.

3.2 BeCl_2 linear 180° ; BCl_3 trigonal planar 120° ; NH_4^+ tetrahedral 109.5° ; gaseous PCl_5 trigonal bipyramidal $90^\circ/120^\circ$; SF_6 octahedral 90° . CO_2 has two electron regions, because each double bond counts as one; the regions arrange linearly.

3.3 Water has a permanent molecular dipole and interacts with the charged rod's field; non-polar cyclohexane lacks a permanent overall dipole, so the observations support the comparison. In a symmetrical molecule, bond-dipole vectors can cancel, as in CO_2 or

BCl_3 . The deflection comparison is qualitative and does not alone determine every bond or molecular structure.