Competition Corner: Occupancy Constraints

g11_u07_w25

Original fictional orbital-card challenges. Use $(N_{\text{bonding}} - N_{\text{antibonding}})/2$; no experiment is implied.

Challenge 21. Card E has 8 bonding and 4 antibonding electrons, including two unpaired electrons. Card F has 7 bonding and 3 antibonding electrons, including no unpaired electrons. Find both bond orders and compare their magnetic-model tendencies. State why one card cannot prove a real substance identity.

Challenge 22. A fictional card initially has 6 bonding and 2 antibonding electrons. It can lose one electron from either a bonding or antibonding orbital. Calculate both possible bond orders and explain which option increases bond order. Name one additional observation needed before connecting either result to a measured bond length.