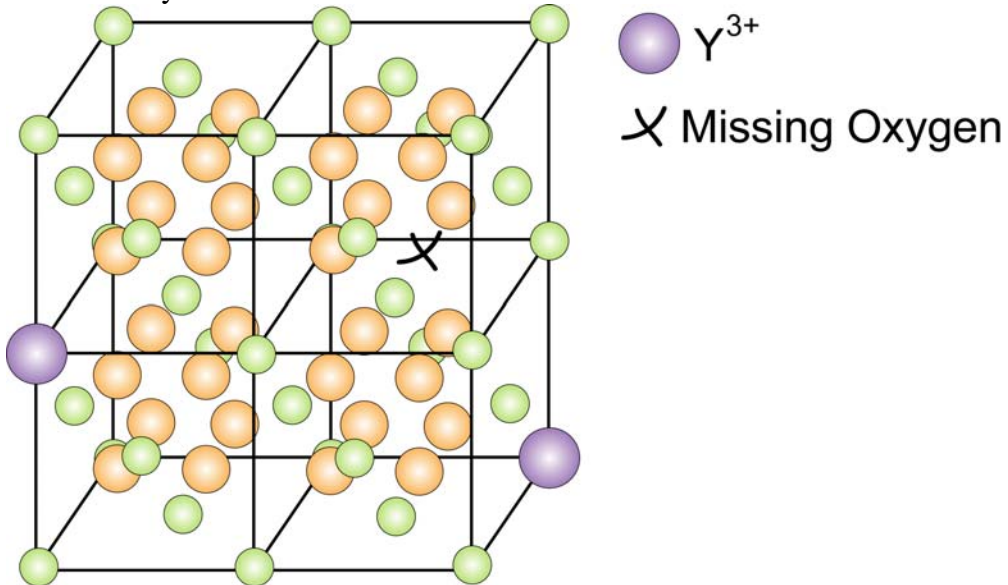


In-Class Exercise
Ceramic Defects
SOLUTIONS

1. Below is the structure for cubic zirconia (ZrO_2). Next week we will talk about why, but for now Y (yttrium) is added to stabilize the cubic form of zirconia. When Y (Y^{3+}) replaces Zr (Zr^{4+}) on the lattice, what other defect is formed to maintain charge neutrality?



When a Y cation replaces a Zr ion, the system has a net 1 negative charge (due to the charge difference of Y and Zr). To maintain charge neutrality, one oxygen must be removed for every 2 Y added.