

Solutions

2.1 They have the same number of electrons in their outer shell.

2.2 LiCl.

2.3 Less reactive; astatine's outer shell is furthest from the nucleus, so it attracts an extra electron least strongly.

3.1 Mendeleev ordered elements (mostly) by atomic weight, putting elements with similar properties in the same group; he left gaps for elements he believed were undiscovered and predicted their properties; when those elements were found with the properties predicted, his table and periodic law were accepted.

3.2 $\text{Cl}_2 + 2 \text{KBr} \rightarrow 2 \text{KCl} + \text{Br}_2$. Chlorine is more reactive than bromine because it gains an electron more easily – a stronger attraction for the outer shell being closer to the nucleus; so chlorine displaces bromide ions from solution.

3.3 Their atoms have stable (full) outer shells – eight electrons, or two for helium; so they neither lose, gain nor share electrons. Going down the group, relative atomic mass and the number of electrons increase; intermolecular forces grow stronger, so more energy is needed to boil the liquid – boiling points rise.