Northern Lights Or The Aurora Borealis: The Process Of Formation

This essay will be about the aurora borealis and more specifically on where those beautiful colors shifting from purple to red that occur mostly at the north and south extremity of our globe come from. The reason behind this topic chosen is quite simple, it’s because a lot of people need to know how natural phenomenon occurs on Earth to be able to take conscience of how lucky we are, how fragile our planet his and how it’s important to protect it. So, to fully understand where those colors come in the first part of the essay will discuss the magnetic field of the Earth and how Auroras Borealis are occurring and in the second part of the collision between the electron coming from the sun and our atmosphere that create the colors.

To begin, the magnetic field of the Earth exists because of the electric currents generated in the Earth's outer core by the convection current of molten iron. Indeed, because of the convection or heat transfer due to the movement of the molecules of the molten iron that are at 5,700°C to the surrounding outer core layer composed of liquid iron and nickel that his at 4,400°C, that produce a powerful electric current that as it turns produce a magnetic field varying from 25 to 65 microteslas. Now, the magnetic field of the earth is useful because it offers us protection against solar wine that are deadly otherwise because of his high-energy particle also call X-ray. But, in those particles, there is also electron that are responsible of creation of aurora borealis and there is where is start to become interesting. In order for them to form Auroras Borealis, they need to reach our atmosphere but our magmatic field block these particles. Therefore, the particles are deflected towards the poles where the magnetic field is weaker and this why we mostly only see that phenomenon occurring at the poles of our planet. Then, when they enter atmosphere and mixt with elements present in it, that is giving beautiful Auroras Borealis. Now that we know the science behind this phenomenon let answer our question that is how the color appears during this spectacular scene.

When the charge particle (electron) is released from the sun they need to hit specific gases in our atmosphere in order to emit light. Indeed, they need to collide with oxygen or nitrogen and excite them enough or ionize them for the nitrogen in order that when they return to their ground state they emit a photon with a specific wavelength. In fact, the ionization of the nitrogen atom produces a photon that have a wavelength of 443.3, 444.7, or 463.0

nm and that emits a blue color. Another color that the nitrogen can emit is a deep red color that have a wavelength varying from 600 to 700 nm when the atom is excited (not iodized). Now, the oxygen atom is responsible for the two main colors in Auroras Borealis. ___ when it is excited he produces a photon with a wavelength of 557.7nm that correspond the his most common color that is the green and he can also emit a wavelength of 630nm that correspond to red depending of the altitude of where the collision occurs.

As surprising at it could seem, depending of the altitude where the collision occurs the resulting color will vary. Indeed, the reason why the green and the red color are the most common color in Auroras Borealis is that the collision occurs at a higher altitude of the atmosphere. In fact, for the green color the collision altitude varying from 120 km to 180 km and the red color is more around 250 km. Therefore, few particles will go below 120 km of the atmosphere but some does

and this is why purple and blue color occurs.