

UNIT 3

STUDENT HANDOUT

EVIDENCE – Metals Research Sheet Found in the Lab

Lithium – Lithium is a necessary part of neurological function. Persons deficient in lithium often exhibit bi-polar disorders of varying degrees, and supplements of lithium are common to treat these disorders. Lithium chloride can be a part of lethal injections administered during executions as it disrupts the nervous system, preventing proper lung and heart functioning. Lithium is most commonly used in batteries and psychiatric settings.

Aluminum – Aluminum is found in many applications and is not toxic in low quantities. Because it is strong but lightweight, it is often used in soft drink cans, car engines and chassis, airplane frames, and cookware. If exposure is both heavy and prolonged, aluminum can cause stuttering, seizures, comas, bone disorders, liver damage, and blood clots that can result in strokes and heart attacks. Aluminum can be found in many industrial settings.

Potassium – Like lithium, potassium plays a vital role in brain function. A person deficient in potassium can suffer from seizures and other neurological defects. However, in large quantities it can be toxic. For example, potassium chloride can be a major component in lethal injections, stopping the heart and breathing and generally preventing the brain from communicating with the rest of the body.

Nickel – Some evidence suggests that nickel is necessary for life in trace amounts. Its toxic effects vary with the oxidation state and the compound it is in when ingested. In very high doses it can cause nausea, abdominal cramps, diarrhea, headache, and shortness of breath. In a case in which a toddler ingested 15 g (an almost absurdly high dose) of a nickel compound, it caused death by cardiac arrest. Nickel is sometimes used in refineries.

Copper – Copper is an essential element for life. Among its many roles in the body, it helps carry oxygen in the blood, is in the active site of many enzymes, plays a role in neurotransmission, and is necessary for the synthesis of adrenaline. If levels of copper get too high, negative effects include liver damage, personality changes, nausea, psychosis, and anemia. Causes of elevated levels can be due to medications, environmental factors, and smoking. Copper is commonly used in electrical industries.

Silver – Though generally harmless, in cases of heavy and prolonged exposure silver can cause liver disease, convulsions, paralysis, and kidney disease. Silver is widely used in the photographic industries.

Barium – Barium is found in most soils and foods at very low levels. When ingested in high levels, barium causes convulsions, hallucinations, nausea, cramps, and paralysis. It is toxic in every water-soluble form. A toxic dose of barium chloride is slightly less than 1 gram.

Lead – Lead has similar effects to barium and mercury, causing vomiting, convulsions, cramps, and paralysis. Lead used to be used in pipes and paint, and can gradually leach into the water supply, slowly poisoning people. As with all heavy metals, prolonged exposure is harmful.