

Energy Drink Handout

Many energy drinks contain sugar, caffeine and a variety of other ingredients such as taurine, guarana and ginseng. Manufacturers claim that they are designed to 'boost' performance and increase stamina. Many health experts believe that it is the sugar and caffeine content that are responsible for this. The caffeine content in the energy drink will provide the athlete with an energy boost, but may also lead to other problems.

Caffeine ($C_8H_{10}N_4O_2$) is a stimulant and it is believed to work by blocking adenosine ($C_{10}H_{13}N_5O_4$) receptors in the brain and other organs.

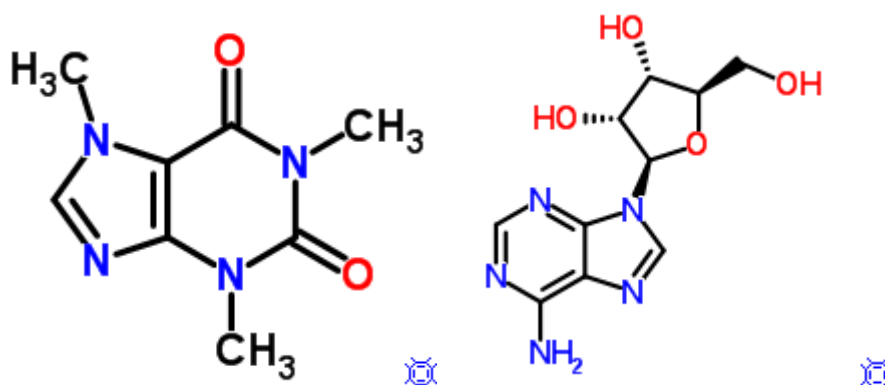


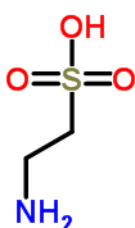
Figure 1 (a) Caffeine

Figure 1 (b) Adenosine

Adenosine is a brain chemical that promotes sleep by slowing down cellular activity and has a similar shape to caffeine. If adenosine receptors are blocked by caffeine molecules, adenosine cannot bind to the receptors to slow down cellular activity. Instead the stimulated nerve cells release the hormone epinephrine (adrenaline), which increases heart rate, blood pressure, and blood flow to muscles. It also decreases blood flow to the skin and organs, and causes the liver to release glucose into the bloodstream, providing a readily available 'energy source'. The overall result is that you feel more alert, active and 'energized'.

Caffeine is also a diuretic, which means that it causes the kidneys to remove extra fluid from the body into the urine, leaving less fluid in the body. The diuretic effect combined with sweating that takes place during exercise can lead to dehydration if only energy drinks are used during long periods of exercise.

Continued exposure to caffeine leads to developing a tolerance to it. Tolerance causes the body to become sensitized to adenosine, so withdrawal causes blood pressure to drop, which can result in a headache and other symptoms. Too much caffeine can result in caffeine intoxication, which is characterized by nervousness, excitement, increased urination, insomnia, flushed face, cold hands/feet, intestinal complaints, and sometimes hallucinations. On the other hand, caffeine has also been shown to reduce the risk of type II diabetes mellitus.



Many energy drinks also contain taurine, which helps regulate heartbeat, muscle contractions and energy levels. Taurine might also be a mild inhibitory neurotransmitter, helping with excitable brain states.