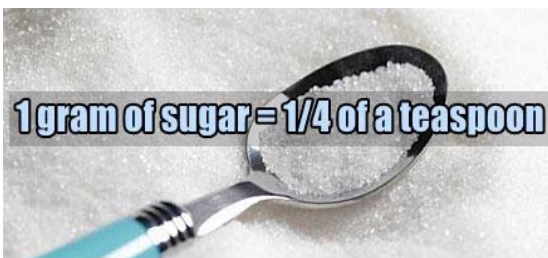


## Station 5A

# TOXICITIES OF SUBSTANCES

in order of increasing toxicity



Compound	formula	LD <sub>50</sub> <sup>1</sup> (oral-rat) (mg/kg)	LD <sub>50</sub> for 70 kg rat <sup>2</sup> (g)	Density <sup>3</sup> (g/cm <sup>3</sup> )
glucose	C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>	25,800	<b>1,820</b>	1.54
saccharin	C <sub>7</sub> H <sub>5</sub> NO <sub>3</sub> S	14,000	<b>980</b>	0.83
vitamin C ( <i>L</i> -ascorbic acid)	C <sub>6</sub> H <sub>8</sub> O <sub>6</sub>	11,900	<b>833</b>	1.69
ethanol	C <sub>2</sub> H <sub>6</sub> O	7,060	<b>494</b>	0.79
methanol <sup>4</sup>	CH <sub>4</sub> O	5,628	<b>394<sup>4</sup></b>	0.79
2-propanol (rubbing alcohol)	C <sub>3</sub> H <sub>8</sub> O	5,045	<b>353</b>	0.79
vitamin A (retinol)	C <sub>20</sub> H <sub>30</sub> O	2,000	<b>140</b>	0.95
acetaminophen <sup>5</sup> (Tylenol)	C <sub>8</sub> H <sub>9</sub> NO <sub>2</sub>	1,900	<b>133</b>	1.34
ibuprofen <sup>5</sup>	C <sub>13</sub> H <sub>18</sub> O <sub>2</sub>	636	<b>46</b>	1.03
aspirin <sup>5</sup>	C <sub>9</sub> H <sub>8</sub> O <sub>4</sub>	200	<b>14</b>	1.39
caffeine <sup>6</sup>	C <sub>8</sub> H <sub>10</sub> N <sub>4</sub> O <sub>2</sub>	192	<b>13<sup>6</sup></b>	1.23
nicotine	C <sub>10</sub> H <sub>14</sub> O <sub>2</sub>	50	<b>3.5</b>	1.01
arsenic(III) chloride	AsCl <sub>3</sub>	48	<b>3.4</b>	2.15
vitamin D <sub>3</sub>	C <sub>27</sub> H <sub>44</sub> O	42	<b>2.9</b>	0.96
tetraethyl lead	C <sub>8</sub> H <sub>20</sub> Pb	12	<b>0.84</b>	1.65
potassium cyanide	KCN	5	<b>0.35</b>	1.52
strychnine	C <sub>21</sub> H <sub>22</sub> N <sub>2</sub> O <sub>2</sub>	2.3	<b>0.16</b>	1.36
coumadin (warfarin)	C <sub>19</sub> H <sub>16</sub> O <sub>4</sub>	1.6	<b>0.11</b>	1.3
mercury(II) chloride	HgCl <sub>2</sub>	1	<b>0.07</b>	5.43
sarin	C <sub>4</sub> H <sub>10</sub> F <sub>2</sub> P	0.55	<b>0.04</b>	1.09
plutonium	Pu	0.3	<b>0.02</b>	19.9
dioxin	C <sub>12</sub> H <sub>4</sub> Cl <sub>4</sub> O <sub>2</sub>	0.02	<b>0.001</b>	1.8
polonium-210	Po	0.00005	<b>0.000003</b>	9.4
botulinum toxin (Botox)		0.000001	<b>0.00000007</b>	

<sup>1</sup> The LD<sub>50</sub> (Oral-rat) values represent the number of mg/kg of body weight that will kill half of the rats that orally consume the amount given. One source used was: <https://chem.nlm.nih.gov/chemidplus/chemidlite.jsp>

<sup>2</sup> The applications of these values to a 70 kg human is subject to question and can result in misleading and inaccurate conclusions. However, this toxicity data is the most widely and generally available information.

<sup>3</sup> Densities are included to demonstrate that most of the substances have densities near 1 g/cm<sup>3</sup>. Reference to the image of 1 gm of sugar should yield a very rough idea of the toxic amount of the substance.

<sup>4</sup> 0.2 g of methanol can cause blindness.

<sup>5</sup> Typical tablets of Tylenol, ibuprofen and aspirin contain a few hundred milligrams of substance, substantially below the LD<sub>50</sub> values of 133 to 14 grams.

<sup>6</sup> A typical cup of coffee contains about 0.1 g of caffeine and a glass of cola about 0.05 g.