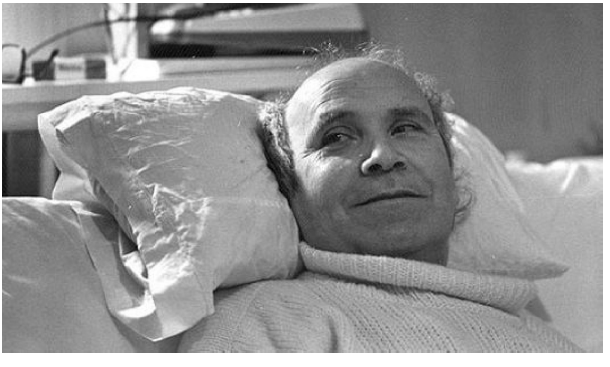
Lethal Inorganic Salts

- Sodium cyanide
- Sodium azide
- Sodium nitrite

Introduction

This Chapter examines a number of non-drug substances that provide a reliable death when ingested. These substances are manufactured for other purposes but are also useful in ending life. Three soluble inorganic salts are considered in this Chapter. They are all water-soluble solids that, when dissolved and taken as a drink, bring about a reliable death. They differ in mode of action, cost and availability. These details are examined below.



Ramon San Pedro

Sodium cyanide - NaCN

The death of Spaniard Ramon Sampedro in 1998 and the subsequent award-winning film *The Sea Inside* focused attention on the use of sodium cyanide as an effective means by which a seriously ill person can put an end to their suffering.

Sampedro, a quadriplegic since a diving accident at age 26, ended his life by drinking a glass of water in which soluble potassium cyanide (KCN) had been dissolved. He died quickly, and peacefully. Many people who have seen *The Sea Inside* have asked why these cyanide salts are not more frequently used by those who are seriously ill to provide a peaceful death. In this Chapter we explain some of the difficulties involved in using cyanide and provide some answers.

Background to Cyanide

In 1814, the carbon-nitrogen (CN) 'radical' common to a number of chemical substances was isolated and given the name 'cyanogen' by the French chemist Joseph Gay Lussac. The subsequent name 'the blue generator' referred to the place of the CN radical in chemicals that were used as blue dyes; the Prussian Blue of blueprints (iron ferro cyanide) is perhaps the best known. In many of these compounds, the CN radical is so tightly bound that the substances are relatively non-toxic.

With the discovery of substances where the CN radical was not so tightly bound - the gas hydrogen cyanide, hydrocyanic acid, and simple salts like potassium and sodium cyanide - it was soon realized that cyanide was extremely toxic to animal cells. By destroying the mitochondria, an essential element within each cell, the CN radical caused rapid cellular death. This causes a red complexion as cells are unable to utilise oxygen in the blood, and death is by cerebral anoxia.

In 1921, cyanide gas (hydrogen cyanide, HCN) was proposed as a humane method of execution and led to the passage of the 'Humane Death Bill' in Nevada. The gas was first used to execute Gee Jon in 1924. Since that time nearly 1000 people have died in the execution gas chambers in the US. All gas chambers used the same method to produce cyanide gas. Pellets of sodium cyanide were dropped into sulfuric acid to release the gas which then enveloped the prisoner.

Hydrogen cyanide is a volatile liquid and can be stabilised and absorbed onto a substrate. In this form (Zyclon B), it was used by the Nazi's during the Holocaust. Originally developed as an insecticide, the pellets were kept in sealed containers and released as HCN gas when the pellets came into contact with air.

Today, cyanide compounds are widely used in industry. Vast quantities of the cyanide salts are produced for use in the gold mining, metallurgy, electroplating and photographic industries. Their toxicity is well known and despite the large quantities used, they remain heavily restricted and difficult to obtain.

Can Cyanide provide a reliable and peaceful death?

Those watching the cinematographic depiction of Sampedro's death would have cause to believe that a death resulting from the ingestion of cyanide salts is peaceful. Unfortunately, not all reports of cyanide deaths support this view. Indeed, there is considerable variation in accounts. While reliability is not an issue, the question most raised relates to the method's 'peacefulness.' Just how peaceful is it to die with cyanide?

Most accounts of death from cyanide poisoning come from witnesses to gas chamber executions where the (unwilling) prisoner inhaled HCN. One study undertaken at San Quentin prison showed that, on average, consciousness was lost within one to three minutes, with death occurring after nine minutes. These deaths were often peaceful with the prisoner falling quickly asleep.

On some occasions, however, a violent (and presumably painful) death was observed. This method of execution was largely abandoned in the US in 1994 when the American Civil Liberties Union took a successful action against the California Department of Corrections. In their action, the ACLU argued successfully that the gas chamber violated the US Constitution's ban against cruel and unusual punishment, because it inflicted needless pain and suffering.

Eyewitness accounts of seriously ill people drinking dissolved cyanide salt are also mixed. In his book *Final Exit,* Derek Humphry describes deaths that are quick and painless. But he also documents one unexplained account that refers to a death that was 'miserable and violent, marked by frequent tetanic convulsions while awake' (Humphry, 1996: 30).

Toxicology texts of death by cyanide commonly refer to a rapid collapse and loss of consciousness if a large enough dose is absorbed. Occasionally, convulsions occur after consciousness is lost. In his book *Suicide and Attempted Suicide: Methods and Consequences,* Geo Stone makes the observation that while cyanide might be commonly used by suicidal chemists, it is used rarely by physicians. He concludes that this may be due to their different levels of access to poisons (Stone, 1999).

In 1995 when the guidelines for the *Northern Territory Rights of the Terminally Ill Act* (ROTI) were being developed the use of cyanide was not considered; better drugs (the barbiturates) were available. Today, cyanide is not used in any country where euthanasia / assisted suicide legislation in place.

Nevertheless, cyanide salts have some very positive properties and play a role in ensuring people have control over their lives. In particular, issues such as the small quantities needed, easy administration, long shelf life, and rapid action can be deciding factors. Ingesting a gram of potassium cyanide in the form of a simple single capsule is seen by some people as offering the best means of ensuring control at the end of life.

The Availability of Cyanide

Soluble cyanide salts have traditionally been hard to obtain unless one has a contact in the industries where these substances are used. These salts are heavily regulated and restricted.

Cyanide is also now recognised as a compound of chemical weapons with associated heavy penalties. The legal risks associated with obtaining this drug may outweigh any possible end of life benefit. Internet claims of availability can be false. Any online purchase must be tested.

Quantofix quantitative cyanide test kit

Testing Cyanide

Purity testing is relatively simple with graded immunoassay test strips. 'Quantofix' manufacture a cyanide test kit with 100 strips, able to read between 1 - 30 mg/litre (Fig above). The cost of the kit is ~ US$100. To establish purity, one dissolves 30mg of potassium cyanide powder into distilled water. A colour change on the test strip will indicate a positive reading.

Using Cyanide for a Peaceful & Reliable Passing

Only a small amount is required (ie. 1-2 gms: a teaspoonful). The sodium or potassium cyanide can be dissolved into half a glass of water. The solution is stable in neutral or alkaline solutions, so do not use carbonated water. The solution should be drunk quickly.

Alternatively, the powder can be packed into 'OO' gelatin capsules and then taken with a glass of water. The powder density is 1.5gm/cc and a single '00' capsule will contain 1.35gm of the powder, 2 capsules is more than enough for a peaceful death.

The effect is greatest when the salt reaches the acid environment of the stomach, so one's stomach should be empty before taking the cyanide.

A noted variation to this methodology was used by computer pioneer Alan Turing, who injected the dissolved salt into an apple before eating it. Alan's actual act of suicide was interestingly omitted from the 2014 film, 'The Imitation Game.'

What about hydrogen cyanide gas?

Potassium cyanide is not the only form of cyanide that is lethal. There is also the gas, hydrogen cyanide.

The process of making hydrogen cyanide gas mimics that used historically in the US gas chamber in acts of capital punishment. There, the solid cyanide salt (sodium, potassium or calcium cyanide) was added to concentrate acid in order create the legal gas. The gas chamber was abandoned in the 1990s by most US states for reasons of being cruel and unusual punishment.

Hydrogen cyanide can be made by placing 500ml of concentrated hydrochloric acid in a plastic bucket and adding a few grams of the solid salt. This will rapidly produce hydrogen cyanide. If this is done in a confined space (a vehicle,or small room with windows shut) the inhalation of this gas will lead to a rapid and inevitable death.

Concentrated hydrochloric acid (>25%) is readily available from hardware stores. The smell of the hydrogen cyanide gas is sometimes reported as similar to that of bitter almonds.

Lethal quantity (~1gm) of KCN

'0'& '00' gelatine capsules

Warning

Be aware that the production of the gas may continue for some time and anyone entering the area may be unaware of the presence of the lethal gas. Warning signs must be posted to protect those who may come across the site. Safety on the Exit RP Test, is therefore low for this method 1/5.

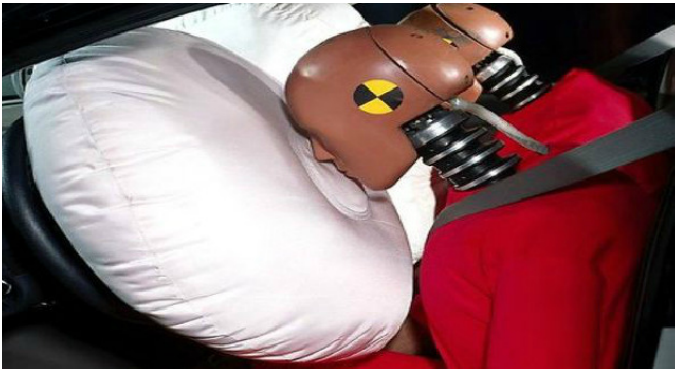
Sodium Azide - NaN_3

Sodium Azide is a colourless, crystalline, water-soluble salt with a number of properties that make it a useful end of life drug. While (almost) as lethal as cyanide, sodium azide is much easier to obtain. It is openly sold on Ebay and Amazon and not generally subject to legal restrictions,

Properties

Sodium Azide is comprised of colorless crystals with the formula, NaN_3. While it is very soluble in water, the salt breaks down explosively into sodium and nitrogen if heated to >300ºC. It is this property that led to its use in car collision air bags. The salt or solutions of the salt can form unstable/ explosive azides if placed in contact with metals. Acidification of a solution, or the addition of acid to the salt itself, can result in the production of hydrazoic acid (HN_3), which is a highly toxic, volatile, shock-sensitive explosive gas.

A solution of the salt in water is an effective end of life drink. Very small quantities will reliably end life.



Sodium azide found use as the active ingridient in auto airbags

Toxic Characteristics

When dissolved in water and ingested, quantities of even 1gm of sodium azide can be rapidly fatal. On ingestion of the salt, the azide is absorbed from the gut and blocks the action of the enzyme cytochrome c oxidaze. This prevents the uptake of oxygen and causes cellular asphyxia and death. The death that follows is 'relatively peacefully'.

Sodium azide affects those organs with the highest need for oxygen, such as the brain and the central nervous system. On swallowing the solution, the salt interacts with stomach acid leading to a drop in blood pressure, acute headache, shock and rapid death.

One should be aware that unlike cyanide, the azide ion has a potent physiological effect even at manifestly sub-lethal doses. Several reports exist of laboratory accidents in which ingestion of as little as 10mg has caused transient, but sometimes dramatic, neurological effects such as seizures, lasting for a few minutes, as well as other symptoms such as severe headache. Basic safe-handling techniques such as the use of gloves are strongly recommended.

The immediate 'pharmacological' effect - as opposed to the delayed but lethal 'metabolic' effect seen after high dose intoxication (10mg/kg and above) - is presumed to be due to the formation of nitric oxide in the central nervous system. This mechanism is related in part to the vasodilation and reduction in blood pressure, discovered when sodium azide was tested as a antihypertensive in the 1950s. In those studies, small doses of around 1mg were administered orally several times a day and proved effective and well tolerated by patients, but were found to be too short-acting to warrant widespread clinical use.

Handling, Storage, and Disposal

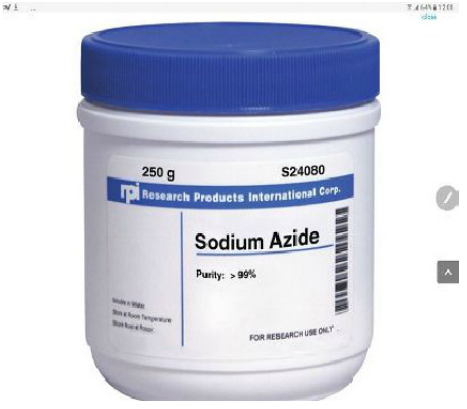
Aqueous solutions of the salt (<5%) is easier to store than the salt. Such solutions can be stored in plastic sealed containers. However, neither the salt nor aqueous solutions should come in contact with metals. This is because of the potential of the substance to form unstable/ explosive compounds when in contact with a number of metals. This means taht disposal of the unused salt or solutions should not be made through the drainage system because contact with metals is a real possibility. The problems associated with handling and management of sodium azide have led to its description as a particularly dangerous substance.

In truth, nearly all the hazards associated with sodium azide are due to accidental formation of its chemical parent, hydrazoic acid, (HN_3). Hydazoic acid a volatile, weak acid but is a shock-sensitive explosive. Unlike the salts, this acid can be absorbed through the skin. Even though the smell of hydrazoic acid is described in the scientific literature as 'extremely pungent', 'obnoxious', and even 'fear-inducing' (and 'unmistakable'), one may not always get adequate warning of its presence.

Should a spill of azide occur, this can be mopped up using a dilute solution of sodium hydroxide (lye, caustic soda). This will prevent the formation of hydrazoic acid, and immediately convert any hydrazoic acid that may be present back to sodium azide. This is in lieu of plain water, Obviously gloves, etc are essential in such a scenario.

See: *http://bit.ly/thenastiestchemical*

Using Azide for a rapid/ peaceful death



Laboratory plastic container of sodium azide

A reliable death can be brought about by mixing 2 -3 gm of the salt into 50ml of distilled or de-mineralised water (do not use soda water) in a plastic or glass container. Do not use a metal spoon. Although the release of toxic HN_3 is minimal during mixing, this should be done in the open air, in a well-ventilated area. This 50ml of 5% solution can then be sealed, and drunk at a later stage to end life. An anti-emetic (eg 3 x 10mg of metoclopramide), taken 30 minutes earlier is advised.

Note: There is no known antidote to the ingestion of sodium azide. This property may be considered desirable in an end of life agent.

Note: Attempting resuscitation on a person who has ingested sodium azide can expose those attempting help to serious danger. Mouth-to-mouth resuscitation can result in the rescuer's exposure to dangerous hydrazoic acid. If vomiting has occurred, the toxic vomit must be avoided for the same reason.

Those choosing to use of azide to end life should display a clear sign indicating that this substance has been used. This will help protect emergency medical staff or police from accidental toxic exposure.

Obtaining Sodium Azide

The toxic properties of sodium azide, its instability, storage difficulties, and its use in the manufacture of explosives mean that the substance is subject to some control, but less than those applied to the cyanide salts.

A number of internet sites offer sodium azide at prices as low as US$10/ kgm.

See: *https://www.alibaba.com/showroom/sodium-azide.html*

The Dutch euthanasia powder 'Middel X'

In September 2017, a Dutch pro-self determination group, Coöperatie Laatste Wil (CLW), went public claiming that they had discovered a new 'Dutch euthanasia powder'. They said this powder would provide their members with a reliable way of ending their lives with no medical involvement. They announced their intention to purchase and subsquently distribute the un-named Dutch powder - 'Middel X' - to their members using finger-print secure safes. Although there was considerable public interest in this development, CLW refused to reveal the identity of the product.

The secrecy over the identity of Middel X led to the development of unrealistic expectations in the minds of the public. Described as an agent 'used as a bacteriostatic on common laboratory preservative' that was 'readily-available and unrestrictable'. And as an 'easy-to-administer' drink, that is 'reliably lethal with as little as 2 gm required'. The group has also described Middel X as having commercial application in the manufacture of car air bags and as having no known antidote. This clearly defined the mystery'Middel X' powder as sodium azide.

Further CLW statements claimed that while Middel X provided a reliable and peaceful death, a headache was possible, but this can be anticipated and dealt with by taking standard analgesics. The symptoms were claimed to match those of carbon monoxide inhalation.

The publicly surrounding the discovery of a new Middel X powder that has such remarkable properties, led to a huge demand for this 'new Pill of Drion'. By refusing to identify the substance, however, CLW has effectively avoided any independent verification or checking of their claims.. This has allowed the myth to persist. Refusal to acknowledge that Middel X is sodium azide also means that CLW has never had to acknowledge any of the significant problems associated with distribution of this substance.

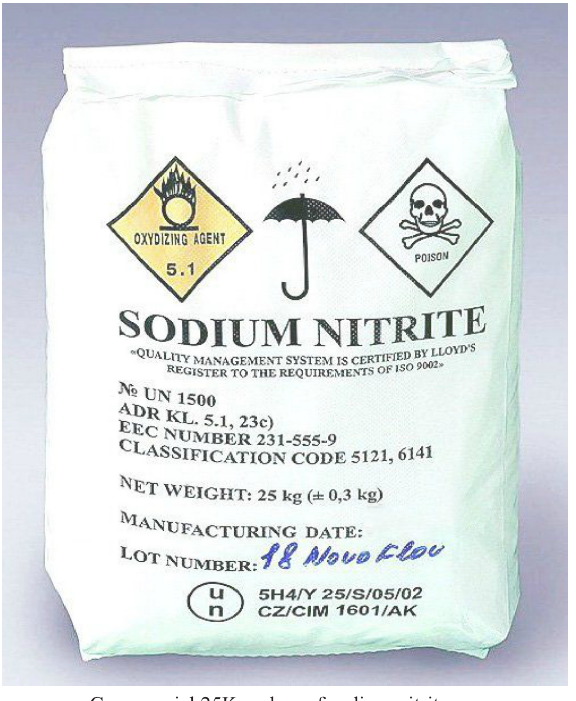
In February 2018 in the Netherlands, a 19 year-old woman, Ximena Knol, suicided. Her parents claimed that she had been encouraged by the actions of CLW and Dutch media reported that Ximena had purchased Middel X from a local chemical retailer. She had said that she needed the salt for a school project. While it is widely believed that it was CLW's azide that was involved in her death, it was later revealed that she had purchased and ingested sodium nitrite.

In March 2018 the NL Public Prosecution Service announced a criminal investigation into the behaviour of CLW and ordered the organisation to cease all activities with immediate effect.

See: *https://www.om.nl/actueel/nieuwsberichten/@102538/strafrechtelijk/*

Summary

Although the speed and reliability of a death from ingestion of sodium azide make this salt a real option, the problems associated with its storage, safe disposal, and the risk it poses to others after death limit its usefulness. Nevertheless, it is one available means that may provide a lawful option for those who have no access to the barbiturate, Nembutal.



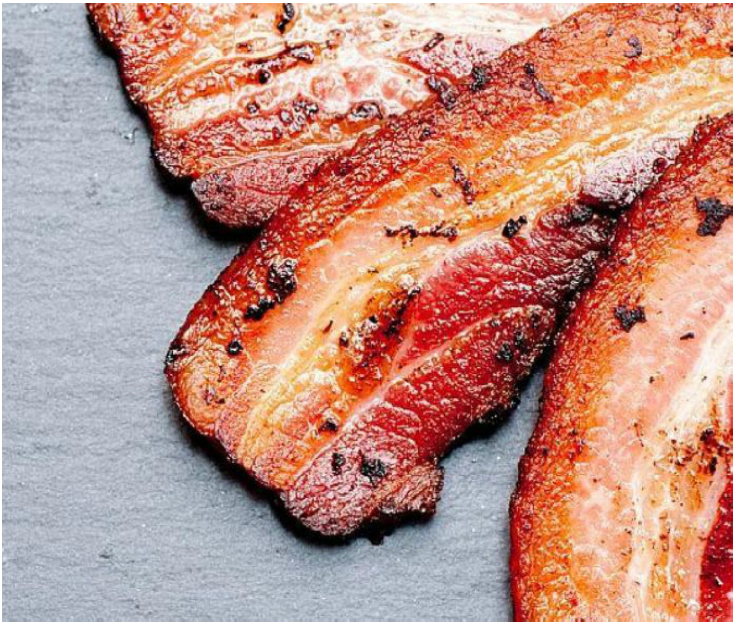
Commercial 25Kgm bag of sodium nitrite

Sodium Nitrite - $NaNO_2$

Introduction

The search for a humane method of controlling Australian wild pig populations has led to the recent trial and adoption of sodium nitrite as an effective pig eradication agent. The same goals that led to this common salt being identified as effective in the control of wild pigs, prompted its examination as method for peacefully and reliably ending human life.

See: *http://bit.ly/wildpiginvasion*



Sodium nitrite is commonly used as a meat preservative

Historically, sodium nitrite has been widely-used as an anti-oxidant in the curing of common meats such as ham, bacon and hot dogs. The salt serves a vital public health function in that it blocks the growth of botulism-causing bacteria and prevents spoilage. Sodium nitrite gives cured meats their characteristic color and flavor. Its widespread use make restriction or legal control of this substance highly unlikely.

Sealed 15 gm container of sodium nitrite

Mode of Action

At a lethal dose, sodium nitrite will reduce a person's oxygen levels which will lead to central nervous system depression, terminal hypoxia and death. Sodium nitrite does this by entering the blood stream and altering the hemoglobin in red blood cells causing methemoglobin. Methoglobin is a form of haemoglobin with a much-reduced ability to combine and transport oxygen, High methemoglobin levels reduce the oxygen-carrying capacity of the blood which is what leads to death (while also changing the blood to a brownish colour).

The protective enzyme system, methemoglobin reductase, also called 'diaphorase'(and more properly called cytochrome b5 reductase and which is normally present in red blood cells) will rapidly reduce the methemoglobin back to hemoglobin. With high nitrite absorbtion rates, this protective mechanism is overwhelmed. Interference with the activity of these enzymes increases the potency of nitrite ingestion. Levels of these protective enzymes are similar in pigs and humans.

The symptoms of a toxic dose of sodium nitrite can include lethargy, confusion, intoxication and headache, before loss of consciousness occurs. In large doses, nitrite acts as a vasodilator because of its relaxing action on vascular smooth muscle and caused a drop in blood pressure (and possible headache).

The estimated lethal dose of sodium nitrite in adults is as little as 5gm, although for an elective death 15gm is advised.

Note: Methylene blue is the antidote for sodium nitrite ingestion. Methylene blue can be administered intravenously Nitrite ingestion can be suspected in any case where cyanosis (blue-ish or purple-ish discoloration of the skin) is not corrected by administration of oxygen.

Using Sodium nitrite for a Peaceful and Reliable Death

Sodium nitrite salt is very soluble in water. To prepare a lethal dose of the salt, 15gm is dissolved into 50 - 100 ml of water. The taste is salty and unremarkable. Vomiting is unlikely. However, a single dose of an anti-emetic (3 x 10 mg of metoclopramide - Maxolon) can be taken 30 minutes before drinking the nitrite solution if vomiting is a concern.

In 2018, a monitored death of a 46 Kg adult who had consumed 15 gm of sodium nitrite dissolved in 50 ml of water resulted in the following data:

- At 3 mins drowsy
- At 5 mins very drowsy, responsive
- At 12 mins unconscious
- At 15 min deep sleep/ unrousable
- At 25 mins steady increasing cyanosis, shallow breathing
- At 42 mins death

Potentiating sodium nitrite

An effective and peaceful death is dependant on the nitrite overwhelming the restorative enzyme methemoglobin reductase. To achieve this, rapid gut absorbtion of the salt on ingestion is needed. This can be facilitated by reducing the amount of gastric acid. This effect is not related to gastric pH, but rather to the production rate of the acid. A pre-dose of the H2 antagonist cimetidine can increase absorption of the nitrite (eg. Tagamet, 800mg, taken 30 minutes before the nitrite).

Sources of Sodium Nitrite

Sodium nitrite is widely used for food-curing and food-preserving with few restrictions. It is readily available on the internet and has no safety issues for transport. Cost is minimal with chemical suppliers offering the product for as little as US$15/ kgm.

See:
http://bit.ly/labshopnl
https://www.amazon.com/Sodium-Nitrite-Powder
http://bit.ly/deoplosmiddelspecialist

Storage and Disposal of Sodium Nitrite

Sodium nitrite is very stable, and can be stored at room temperature, but must be stored in a sealed container. Sodium nitrite is also hygroscopic. This means that when it is exposed to air, it absorbs water and is slowly oxydised to sodium nitrate. This renders it ineffective as an end of life agent.

There are no specific concerns with the disposal of unused nitrite and shelf life of properly stored salt is almost infinite.

Cyanide, Azide & Nitrite - RP Test

For a substance or drug to be useful as a Peaceful Pill two main criteria must be met. It must be 'Reliable', and it must be 'Peaceful'.

Reliability of Sodium Cyanide, Sodium Azide and Sodium Nitrite are high. Few people will ever survive the ingestion of 2 gm of sodium cyanide or azide. For nitrite, a larger quantity is needed, and reliability is a little less, R=7.

There is also a correlation between the size of the dose and the speed of death and this minimises the chance of any adverse symptoms developing.

In terms of Peacefulness, mixed accounts make this a difficult characteristic to assess. Clearly, the size of the dose, and the speed of onset of symptoms to loss of consciousness, is relevant. A severe headache is an invariable sympton of azide ingestion.

Availability - Cyanide salts are heavily regulated and hard to obtain. Azide salts are easier to source on the internet. Nitrite salts are the easiest to obtain, with no effective surveilance.

Preparation - Each of these salts is water soluable and can be consumed as a drink. Care must be taken when dissolving azide to avoid the production of hydrazoic acid.

Undetectability - At autopsy all three salts will be detected. A note should be displayed if cyanide or azide have been used. A cyanide death may be detectable from the pink color of the skin and a possible smell of bitter almonds. With nitrite, clinical darkening of blood color (associated with nitrite methaglobin) can be noticed in the skin showing a brown color.

Speed - A very quick death for azide and cyanide, slower with nitrite.

Safety - Care must be taken to avoid any accidental exposure if sodium azide is used . If vomiting occurs after azide or cyanide ingestion, the gastric contents may give off dangerous HN_3 or HCN.

Storage - With proper storage, the sodium salts have an almost indefinite shelf life.

Criteria	**Sodium cyanide**	**Sodium azide**	**Sodium nitrite**
Reliability	10	9	7
Peacefulness	5	6	7
Availability	1	3	4
Preparation	4	3	5
Undetectability	3	3	2
Speed	5	5	3
Safety	2	2	5
Storage	5	3	5
Total	35 (70%)	34(68%)	38(76%)