

THE NATIONAL SCIENCE COMPETITION REPORT

The National Science Competition was held at the Nairobi School on the 29th August, 2008. Schools from Rift Valley, Central, Nyanza, Coast, Eastern, North Eastern and Western Provinces participated in the competition. Participants from Nairobi Province were however absent in spite of the competition being held within Nairobi.

There were two different topics that were tackled namely **River pollution** and **Acid indigestion**. There was very stiff competition among the students in both topics as they displayed high levels of creativity, ability to set and achieve the objectives, ability to communicate and present scientific ideas including the use of IT. The winning students (Positions 1 - 3) were awarded trophies and text books. All the participants were also given RSC Chemnet notebooks, pens, balloons, Visual elements trumps and a certificate of participation. The findings of the students are summarized below.

RIVER POLLUTION

Sources of nitrates and phosphates in streams and rivers

- Inorganic fertilizers
- Untreated sewage
- Detergents
- Industrial Effluent
- Lightning – Produces a lot of energy which initiates a slow combination of nitrogen and oxygen to form NO which is later oxidized to NO₂. This dissolves in water to form HNO₃ which reacts with minerals in the soil to give nitrates that are later washed into rivers and streams
- Exhaust fumes from vehicles. NO gets oxidized in the air to form NO₂ which later forms acid rain. The acid rain on reacting with minerals in the soil forms soluble nitrates which find their way into water masses.

Effects of river pollution by nitrates and phosphates

- Eutrophication
- Methaemoglobinemia - Blue baby syndrome in infants

Preventive measures

- Treatment of sewage
- Treatment of industrial waste
- Correct use of fertilizers
- Encourage organic farming
- Fitting exhaust systems of vehicles with catalytic converters to convert the nitrogen oxides to harmless nitrogen gas
- Enforce laws that will control industries from discharging their effluents into rivers without proper treatment

Other water pollutants

- Oil spillage

- Silt
- Presence of heavy metal ions

The efforts being made to remove phosphates and nitrates from water masses was however not tackled.

The list below shows how the students were ranked.

NAMES	SCHOOL	PROVINCE	MARKS (Out of 30)	POSITION
Elijah Oridi Allan Mwangi	Menengai High	Rift Valley	28.50	1
Jackton Ogembo Emmanuel Juma	New Kisumu High	Nyanza	26.75	2
Sandia Matere Seline Keya	Lugulu Girls	Western	26.50	3
Purity Ndiga Noreen Mbae	Materi Girls	Eastern	25.50	4
James Kariuki Daniel Gitahi	Alliance Boys	Central	25.25	5
Hellen Masido Florence Luvano	Waa Girls	Coast	25.00	6
Mustaf Salat Abdirizak Omar	County School	North Eastern	20.75	7

ACID INDIGESTION

Acid indigestion (also called dyspepsia) may be caused by

- Stress /Anxiety
- Chronic usage of anti-inflammatory medicine such as Asprin, Ibuprofen
- Unhealthy eating habits such as swallowing food fast, over eating, insufficient mastication, etc
- Excessive consumption of alcohol and cigarette smoking
- Excessive fatty and spicy foods

Some of the symptoms include

- Pain in the upper abdomen
- Heart burn
- Constipation
- Belching

Antacids such as Actal, Maalox, Eno, Andrew's liver salt, etc have been used to treat acid indigestion. Their main function is to neutralize the high acidity of the stomach. Pepsin enzyme which helps in digesting proteins in the stomach however works in an acidic medium (pH = 2). Uncontrolled or excessive use of these medications may therefore lead to

- Impaired functioning of protein enzymes
- Amino acid deficiency
- pH imbalance
- Failure of mineral breakdown due to low concentration of HCl
- Reduced absorption of mineral ions
- Mineral ion imbalance (hypercalcemia) due to overconsumption of calcium-alkali antacids
- Food poisoning (helicobacter) due to build up of bacteria in the stomach when the concentration of HCl is low
- Food allergies which may stem from partially or undigested proteins
- Over secretion of HCl to restore the normal pH of the stomach

To overcome these side effects

- Bio-alternative methods such as taking carrot or aloe vera juice may be used. These juices regulate acid production without irritation, inflammation and discomfort of the stomach mucus membrane.
- Manage stress
- Change life style and use proper eating habits

The table below gives the ranking of the students who participated.

NAMES	SCHOOL	PROVINCE	MARKS (Out of 30)	POSITION
Anthony Mate M. Joel Shirajiru	Friends' School, Kamusinga	Western	27.50	1
Salma Abdillahi Munira Said	Waa Girls	Coast	26.50	2
Lucy Wandia Jessie Wachera	Bishop Gatimu Ngandu	Central	24.50	3
Winnie Otieno Rose Raudhi	New Kisumu High	Nyanza	23.00	4
Fatuma Mkwariza Maeri J. P. Mito	Moi Forces Academy, Lanet	Rift Valley	22.50	5
Catherine Mueni Penina Waeni Y.	St. Joseph's Girls	Eastern	20.00	6
Ali Khalif Ahmed Noor	Garissa High	North Eastern	20.00	6