

SCIENCE SPAZA

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RADIOCARBON DATING - NC- NC IXESHA LE CARBON!



KUTHENI USOMBA UMHLABA? INGABA KUKHO INTO ELAHLEKILEYO?

OH!, MHOLO. KUBONAKALA NGATHI KUKHO INTO ESIVIFUMANAYO- EYASHIYWA NGABANTU ABABELAPHA NGAPHAMBI KOKUBA KUBEKHO THINA.

OBANI? ABA BAKHENKETHI SIDLULE KUBO PHAMBILI PHAYA?



HAYI, SINGABANTU ABAFUNDA ZEBHALLUTYE IMVELAPHI YOLUNTU, IZIXHOBO ABABEZISEBENZISA NGAPHAMBILI PHAYA KUNYE NEENTSALELA EZINGQINA OKO, NGOKUTHI SOMBE KULONDAWO (ARCHAEOLOGISTS).

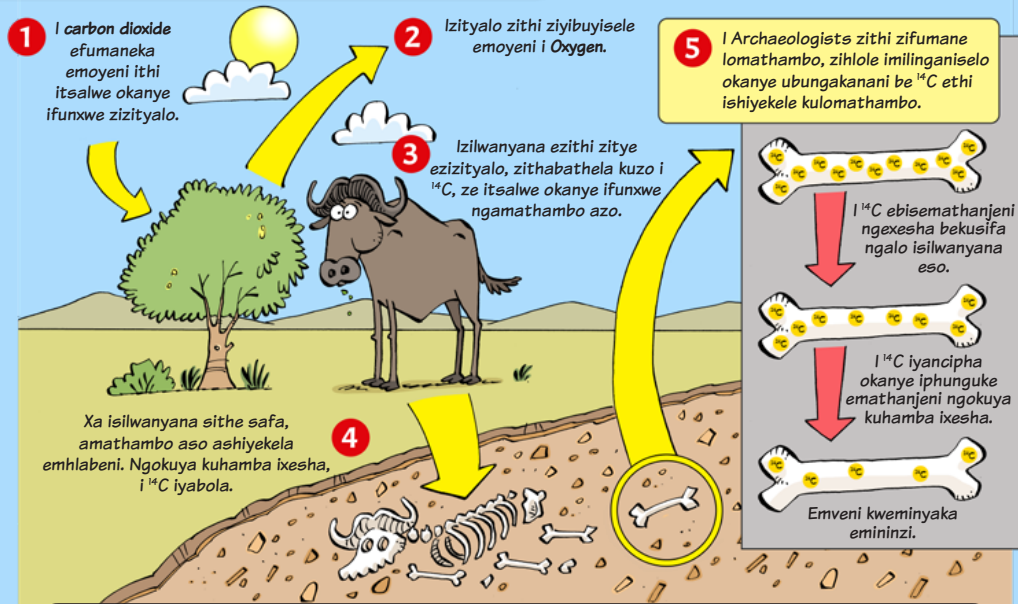
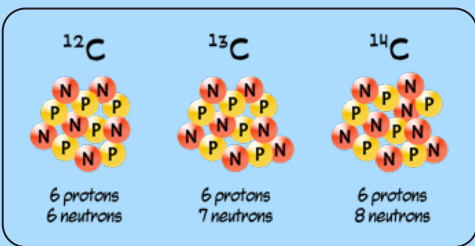
YHOOO! NIKWAZI NJANI UKUQIKELELA IMINYAKA VAZO?



KUBA IBHALIWE KWINTSALELA EZINCINANE EZENZA EZOZINTO SITHI SIZIFUMANE. NDIINGU NOMONDE. UKUBA LIYAFUNA, NDIINGAKUBONISA UKUBA UFUNDA NJANI NGEXESHA ELADLULAYO.

YHOOO!, EWE NDIINGAKONWABELA OKO.

NTSHAYELELO NGE RADIOCARBON DATING



Zonke izinto eziphilayo zithi zitsale/ziFunxe i carbon de zibe ziyafa. Phantsi kweemeko eziqhelekileyo, i carbon ine protons ezintandathu kunye nee neutrons ezintandathu. Lonto yenze ukubasijibize i ^{12}C . Kodwa ngamanye amaxesha i carbon ekhethekileyo iye idalwe kukuphuma kwamandla ngemitha yezinto ezithi zifumaneke ngokwendalo emoyeni okanye elangeni (radiation). Ibizwa ngokuba yi ^{14}C xa ithhe xaxe nge neutrons ezimbini. I ^{14}C iye yohluka-hlukane, itshintshe ubume, ibe yi Nitrogen xa enye yee neutrons isiba yi Proton. Ibizwa ngokuba yi Radiocarbon dating, yaye isincedisa ukuphendula imibuzo malunga nexesha eladlulayo.



KONKE OKU KWENZA UKUBA SIKWAZI UKUBONA UKUBA LONTO Yafa NINI, NGOKUTHI SIQHATHANISE LIBUNGAKANANI BE ^{12}C NE ^{14}C EFUMANEKA KUYO. IYE IBIZWE NGOKUBA VI RADIOCARBON DATING, KWAVE ISINCEDISA UKUBA SIKWAZI UKUPHEDULA IMIBUZO MALUNGA NEXESHA ELADLULAYO.

Knowledge is Ncah!



ZENZELE EYAKHO INDAWO YOKUMBA

II **ARCHAEOLOGISTS** (ABEMBI BEZINTO ZAKUDALA) BAFUNDA MALINGA NEXESHA ELADLULAYO NGEZINTO ABANTU ABATHI BAZISHIYE NGASEMVA. OKU KUBIZWA NGOKOMBA OKANYE I 'DIG'!



LIZAKUDINGA:

- IBHOTILLE YE PLASITIKI EKHANYAYO, ESIKWE UMNTLA OKANYE I JAGI YE GILASI.
- INTLOBO EZAHLUKENEYO ZOMHLABA.
- "ARTEFACTS" - EZI, INGANGAWO AMALAHLE, IINTSIMBI ZEHOMBO, AMAGQABI OKANYE IZINTI.
- INCWADANA YOKUBHALA KUNYE NOSIBA LOKUBHALA
- IBRASHI OKANYE ICEPHE.



1

GCWALISA IBHOTILE NGE SANTI. UNGASEBENZISA UMNTLA WEBHOTILE NJENGE FANELA.



2

BEKA I ARTEFACT KWIZINGA NGALINYE (BEKA INTO PHEZU KOMGCA OKANYE UMGANGATHOS WESANTI). UNGABEKA AMAGAMA EBHOTILENI, KUMAZINGA OHLUKENEYO USOKHA IGAMA OKANYE UMYALEZO. KUFUNEKA WOMBE NGOBULUMKO UKUZE UWAFUMANE EME NGENDELELA EYIYO.



3

TSHINTSHISA IBHOTILE YAKHO NEYOMHLOBO WAKHO ZE UQALISE UKOMBA. KHUMBULA II ARCHAEOLOGISTS (ABEMBI BEZINTO ZAKUDALA) ZISOLOKO ZINOBULUMKO BOKUSHICILELA YONKE INTO EZIYIFUMANAYO.

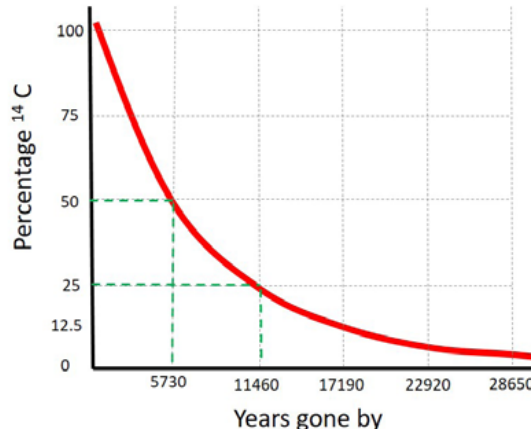


KWENZEKE NTONI APHA?

IMIGANGATHO EYAHLUKENEYO YOMHLABA, ISINIKA UQIKELELO LOBUNGAKANANI KWEZINTO EZIFUMANEKA KWIMIGANGATHO EYAHLUKENEYO XAZIQHATHANISWA NEZINYE. OKU KUBIZWA I **RELATIVE DATING** (UPHANDO **NGOKUQHATHANISA**).

I **RADIOCARBON DATING** INGASINCEDISA UKUFUMANISA NCAKASANA UBUNGAKANANI BOMGANGATHO-OKWAZIWA NGOKUBA YI-**ABSOLUTE DATING** -NGOKUQHATHANISAI ^{14}C KUNYE NE ^{14}C ELABHOLETRI.

Emveni kweminyaka engamawaka amahlanu, amakhulu asixhenxe anamashumi amathathu (5730 years), umlinganiselo ongange siqingatha se ^{14}C yoqobo seyabolayo. Elixesha libizwa isiqingatha sobom (half-life) and sancedisa ii Archaeologists zazi ukuba lingakanani na ixesha lento eyafayo.



Umzekelo, ukuba i artefact inomlinganiselo onganga mashumi amabini anesihlanu 25% ye pesenti ze ^{14}C siye sazi ukuba kuphume iziqingatha ezibini ngokwahlukeneyo. Lilonke iqikelelwa ukuba yayikho kwinyaka engamawaka amahlanu, anamakhulu asixhenxe namashumi amathathu wengeze (+) amanye amawaka amahlanu, anamakhulu asixhenxe namashumi amathathu ikunike (=) Amawaka alishumi elinanye, namakhulu amane kunye namashumi amathandathu. (5730 + 5730 = 11460 years!)



ESIZIDLA NGAKHO KWAMANDULO



IINKCOCHOVI ZAMAWA ASE WATERFALL BLUFF KWELASE MAMPONDWENI, KWIMPUNA KOLONI ZIGCINE UNXWEME OLUKUFUPHI LUKHUSELEKILE, IXESHA ELINGAMA WAKA EMINYAKA. APHA, IQELA LEENGICALI ZENZULULWAZI ZIFUNDA UMQOLOMBA (ROCK SHELTER) OPHAKAME KAKHULU NGOKWANELEYO KWINKCOCHOVI, UKUYIKHUSELA KUMAZA APHAKAMILEYO WOLWANDLE, APHO BAFUNDA KHONA NGABANTU ABABEFUDULA BEHLALA APHO, INDALO KUNYE NOKUTYA OKWAKUTYIWA ELUNXWEMENI NGELOXESHA.

EZI NZULULWAZI NAMATHUBA EMISEBENZI YAZO

Iingcaphephe ze radiocarbon dating zinamathuma aphantangaleleyo okukhetha oko banokuthi bakwenze, njenge Nanotechnology, Biomedicine, Forensics, the nuclear industry, ezophando nzulu kunye ne Archaeology.



U-Riviningo Khosa uyingcaphephe esakulayo kuphando nge nzululwazi e iThemba LABS, Indawo enkqenqeza phambili eMzantsi Africa, kwi-radiocarbon dating. Uphando lwakhe lubandakanya ubume bomhlaba, umhlaba kunye nemilambo ngokuya kuhamba ixesha, ngokujonga imilinganiselo ye isotopes. U Riviningo unomdla kwi isotopes ezenziwa zethiziphume ngokwemitha (radiation) esuka kokusingqongileyo, ebizwa nge cosmogenic nuclides.

UNXULUMANO NOKUFUNDWA ESIKOLWENI

- *Izibalo zebanga le sixhenxe ukuyotsho kwele thoba (7-9):*
Ukuzoba nokuhlalutya i (graph)
- *Izifundo ze Natural Science zebanga le 7-9:*
Ithebula yezakhi machiza (Periodic table) kunye nesisindo manani (Atomic numbers).
- *Izifundo ze Physical Science zebanga le 10-12:*
Ukwakhetha kwe Atoms, Isotopes kunye ne radioactivity.



UBUNCWANE BE ISOTOPE

I ISOTOPES ZIINTLOBO EZIKHETHEKILEYO ZE ATOM, EZINE NEUTRONS EZITHE XAXE OKANYE EZIPHUNGUKILEYO.

NGAPHANDLE NJE KWE CARBON, II ISOTOPES SEZINYE II ELEMENTS EZILIQELA (EZIHLIKIHLE BOMVU APHA) ZISETYENZISWA UKUFUMANA LUBUDALA BEZINTO EZO ZITHE ZAFUMANEKA XA KUSOMBIWA.

MANGAPHI AMAGAMA ONAKO UKUWENZA USEBENZISA IISIMBOLI ZEZI ELEMENTS?

53 I Iodine	6 C Carbon	20 Ca Calcium	92 U Uranium	14 Si Silicon	38 Sr Strontium
4 Be Beryllium	3 Li Lithium	5 B Boron	8 O Oxygen	18 Ar Argon	19 K Potassium
17 Cl Chlorine	15 P Phosphorus	5 Pb Lead	7 N Nitrogen	26 Fe Iron	2 He Helium

LIMZEKELO:

4 Be Beryllium	18 Ar Argon
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= BEAR



UNGAKWAZI UKUFUMANA IGAMA ELINONOBUMBA ABATHANDATHU?
CLUE: IFUMANEKA KUZO ZONKE IZINTO EZIPHILAYO

ZIQALELE ESAKHO ISIPHAZA SE SCIENCE

Ingaba uyafuna ukuziqalela i club ye science kwisikolo sakho? Sithumelele ezinkcukacha zilandelayo, i science sphaza izakuqhakamshelana nawe.

Isikolo: _____

Igama lakho: _____

Inombolo yomnxeba: _____

Idilesi ye imeyile: _____

Idilesi yokuhlala: _____

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SIFUNA UKUVA KUWE!

SINGAKUVUYELA UKUBONA IZITHOMBE ZE MINI-DIG VAKHO, KWAYE SIVE UKUBA UFUNENE AMAGAMA AMANGAPHI. NDWENDWELA I-SCIENCE SPAZA YETHU KWIKHASI LEZONXIBELELWANO KU FACEBOOK, OKANYE USITHUMELELE IZITHOMBE ZAKHO KUWHATSAPP, KULE NOMBOLO ILANDELAYO: 076 173 7130.



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The P5 Project is an international and interdisciplinary collaboration of researchers studying human adaptations to coastal environments. More information about the P5 Project can be found at <https://p5project.org>, via facebook at <https://www.facebook.com/pfiveproject/>, via twitter at <https://twitter.com/p5project> and on YouTube.

