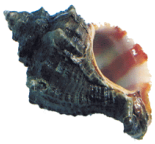
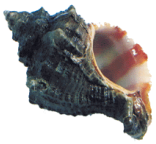


תכלת



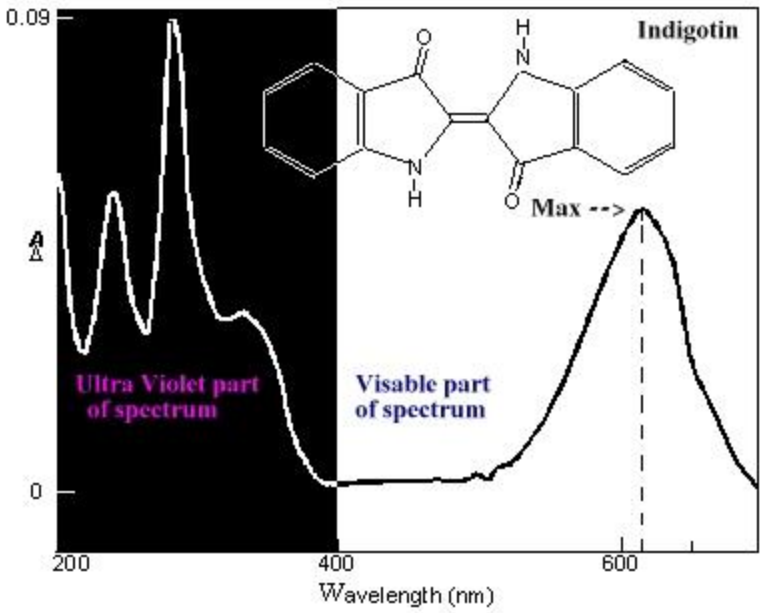
A description of a substance that sets it uniquely apart from other substances can be given by its maximum absorption wavelength.
This determines the color the material will be.

After processing, the dye from Murex Trunculus is chemically identical to Indigotin ($C_{16}H_{10}N_2O_2$).

The maximum absorption wavelength of Indigotin (within the visible spectrum):

$$\lambda_{MAX} \approx 613-620nm$$

From the word Techeles, this wavelength can be derived:



Absorption spectrum in the u.v. and visible light region of indigotin. (From Wouters and Verhecken, JSDC Vol 107, July/August, 1991.)

		Techeles	=	**תכלת**
T	=	**Set of gematrias**	=	**{400, 30, 20, 400}**
$\sum T$	=	**Sum of 1sts**	=	**13**
$\sum_{1st} T$	=	**Total Sum**	=	**850**
$\prod T$	=	**Total Multiplication**	=	**96,000,000**

Using the above gematrias of Techeles, and assuming the Torah would give the wavelength in the biblical measure of an Ama (cubit), we indeed find this maximum absorption wavelength within the word techeles:

$$\lambda_{MAX} = \frac{10 \times \sum_{1st} T}{\prod T} = 1.354167 \times 10^{-6} Amos \times \frac{18 inches}{Amos} \times \frac{0.0254 meters}{inch}$$

$$= 6.1912 \times 10^{-7} meters = 619.12nm!!!$$

I have chosen an Ama to be precisely 18 inches. This of course might not be the case since there are alternating opinions and accuracies. However, if this gematria is true, then by precisely measuring the maximum absorption wavelength of techeiles, one could find the exact measure of an Ama!

Why multiply by 10? What about other colors?

In the above calculation, it was necessary to multiply the calculation by 10 in order to have the result be in the correct order of magnitude for nano-meters. Although I feel that the fact the significant numbers work out is nice enough on its own merits (without consideration of one order of magnitude change), I found a possible, yet arbitrary reason for it. My reason involves other colored materials in the Torah: Tolaas and Argomon.

Using the same formula as the Techeles calculation, one can get numbers from other colored materials. However in order to have these calculations be in the nano-meter range, a factor must be multiplied like the 10 multiplied above:

Tolaas:

Tl	**= Set of gematrias**	**=**	**{400, 70, 30, 6, 400}**
$\sum_{1st} Tl$	**= Sum of 1sts**	**=**	**15**
$\sum Tl$	**= Total Sum**	**=**	**906**
$\prod Tl$	**= Total Multiplication**	**=**	**2,016,000,000**

$$\lambda_{MAX} = \frac{100 \times \sum_{1st} Tl}{\prod Tl} = 7.4405 \times 10^{-7}\, Amos \times \frac{18 inches}{Amos} \times \frac{0.0254 meters}{inch}$$

$$\boxed{= 3.4018 \times 10^{-7}\, meters = 340.18 nm}$$

Argomon:

A	**= Set of gematrias**	**=**	**{(sofis)700, 40, 3, 200, 1}**
$\sum_{1st} A$	**= Sum of 1sts**	**=**	**17**
$\sum A$	**= Total Sum**	**=**	**944**
$\prod A$	**= Total Multiplication**	**=**	**16,800,000**

$$\lambda_{MAX} = \frac{1 \times \sum_{1st} A}{\prod A} = 1.0119 \times 10^{-6}\, Amos \times \frac{18 inches}{Amos} \times \frac{0.0254 meters}{inch}$$

$$\boxed{= 4.6264 \times 10^{-7}\, meters = 462.643 nm}$$

As you can see, there is somewhat of a pattern, which admittedly makes little meaningful sense:

- For Techeles, the gematria was 850 (a zero in the one place) and the calculation multiplied by 10.
- For Tolaas, the gematria was 906 (a zero in the tens place) and the calculation multiplied by 100.
- For Argomon, the gematria was 944 (no zero) and therefore the calculation had no multiple (by 1).

One problem is, is that I have no clue if the wavelengths of these other two calculations are at peaks in the absorption spectrum of the substances whose name the lengths were derived. The wavelengths are in the visible part of the spectrum (or very close to it) and are sufficiently placed for a possibly absorption maximum. More research would be needed. Also, argomon which is purple, would probably have more than one peak wavelength.