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Determination of the Effect of Sound on *Pandanus Amaryalifolious* Leaves Extracts Using X- Ray Tubes Techniques

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ABSTRACT

In this work two samples of a *(Pandanus amaryalifolious)* leaves extracts, were exposed to sound waves length of (528 nm and 741 nm) while the third sample of the leaves was left without exposure to any sound. There was difference of absorption in each sample; these differences were detected using X-Ray Tubes Techniques. The difference of absorption showed the range of germination is not the same in the three samples. As well as the difference in the combination's bonds of the fundamental molecular vibrations as well.

Introduction

Sound is a form of energy that can be heard by humans' ear. It is a mechanical longitudinal wave and as such consists physically in oscillatory elastic compression and in oscillatory displacement of a fluid ,therefore the medium acts as storage for both potential and kinetic energy, they can travel through any material medium with a speed that depends on the properties of the medium , As the waves travel the particles in the medium vibrate to produce changes in density and pressure along the direction of motion of the wave . These changes result in a series of high –pressure and low – pressure regions, if the source of the sound waves vibrates sinusoidal, the pressure variations are also sinusoidal. We shall find that the mathematical description of sinusoidal sound wave is identical to that of sinusoidal string waves.

- Sound waves are divided in to three categories that cover different frequency ranges:
- Audible waves are waves that lie within the range of sensitivity of the human ear (20 Hz – 20K Hz) they can be generated in a variety of ways such as by cords and loud speakers.
- b-Infrasonic waves are waves having frequencies below the audible range (below 20 Hz) elephants can use infrasonic waves to communicate with other even when separated by many kilometers.
- Ultrasonic waves are waves having frequencies above the audible range (above 20K Hz) the ultrasonic sound emits easily heard by dogs, although humans cannot detect it at all, ultrasonic waves are also used in medical imaging [1,2,3].

X-ray Tubes is a vacuum tube that converts electrical input power into X-rays. The availability of this controllable source of X-rays created the field of radiography, the imaging of partly opaque objects with penetrating radiation. In contrast to other sources of ionizing radiation, X-rays are only produced as long as the X-ray tube is energized. X-ray tubes are also used in CT scanners, airport luggage scanners, X-ray crystallography, material and structure analysis, and for industrial inspection. Increasing demand for high-performance Computed tomography (CT) scanning and angiography systems has driven development of very high performance medical X-ray tubes.Spectrum of the X-rays emitted by an X-ray tube with a rhodium target, operated at 60 kV. The smooth, continuous curve is due to bremsstrahlung, and the spikes are characteristic K lines for rhodium atoms. As with any vacuum tube, there is a cathode, which emits electrons into the vacuum and an anode to collect the electrons, thus establishing a flow of electrical current, known as the beam, through the tube. A high voltage power source, for example 30 to 150 kilovolts (kV), called the tube voltage, is connected across cathode and anode to accelerate the electrons. The X-ray spectrum depends on the anode material and the accelerating voltage.

- Electrons from the cathode collide with the anode material, usually tungsten, molybdenum or copper, and accelerate other electrons, ions and nuclei within the anode material. About 1% of the energy generated is emitted/radiated, usually perpendicular to the path of the electron beam, as X-rays. The rest of the energy is released as heat. Over time, tungsten will be deposited from the target onto the interior surface of the tube, including the glass surface. This will slowly darken the tube and was thought to degrade the quality of the X-ray beam. Vaporized tungsten condenses on the inside of the envelope over the "window" and thus acts as an additional filter and decreases the tubes ability to radiate heat. Eventually, the tungsten deposit may become sufficiently conductive that at high enough voltages, arcing occurs. The arc will jump from the cathode to the tungsten deposit, and then to the anode. These arcing causes an effect called "crazing" on the interior glass of the X-ray window. As time

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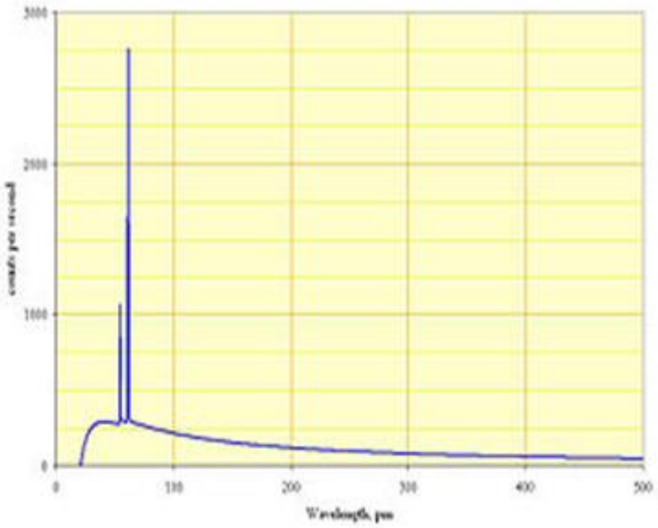
goes on, the tube becomes unstable even at lower voltages, and must be replaced. At this point, the tube assembly (also called the "tube head") is removed from the X-ray system, and replaced with a new tube assembly. The old tube assembly is shipped to a company that reloads it with a new X-ray tube.

• The X-ray photon-generating effect is generally called the bremsstrahlung effect, a contraction of the German bremsen meaning to brake, and Strahlung meaning radiation. The range of photonic energies emitted by the system can be adjusted by changing the applied voltage, and installing aluminum filters of varying thicknesses. Aluminum filters are installed in the path of the X-ray beam to remove "soft" (non-penetrating) radiation. The number of emitted X-ray photons, or dose, are adjusted by controlling the current flow and exposure time [5,6,7].



Spectrum of the X-rays emitted by an X-ray tube with a rhodium target, operated at 60 kV. The smooth, continuous curve is due to bremsstrahlung, and the spikes are characteristic K lines for rhodium atoms.

Material & Method

Apparatus

X- Ray* tubes *Specifications

Incandescent cathode tubes heated directly; gold anode embedded in copper block; with screw thread for cooling element and 2-pole pin contact for cathode heating; suitable for X-ray (554 800 and 554 801).

Max. Emission current: 1 mA

Max. Anode voltage: 35 kV

Focal spot size: approx. 2 mm²

Minimum length of operation: 300 hours

Diameter: 4.5 cm

Length: 20 cm

Mass: 0.3 kg

X-ray Tubes

Experiment Setup

Sample preparation

The three leaves were dried about ten days, then crushed and mixed with water drops until they became a paste then stuffed in container as shown.

Samples as paste stuffed inside capsules container

Method

The samples were placed (on fixed stand) inside the tubes one by one. Then exposed to moving x-ray source for 4.36 min with different incident angles from 2.5° to 24°. Graphs of Roentgen /1/s against incident angles were plotted.

Conclusion

X-rays interact with plants is very different than the physics of how x-rays interact with dense materials like bone or metal. This is due to x-ray absorption by the three leaves samples. *Fig. (1)* shows a significant difference between the three samples.

The difference of absorption because the range of germination is not the same in the tree samples. As well as the difference in the combination's bonds of the fundamental molecular vibrations of C–H, N–H, O–H, and S–H functional groups for the three samples as well.

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Results

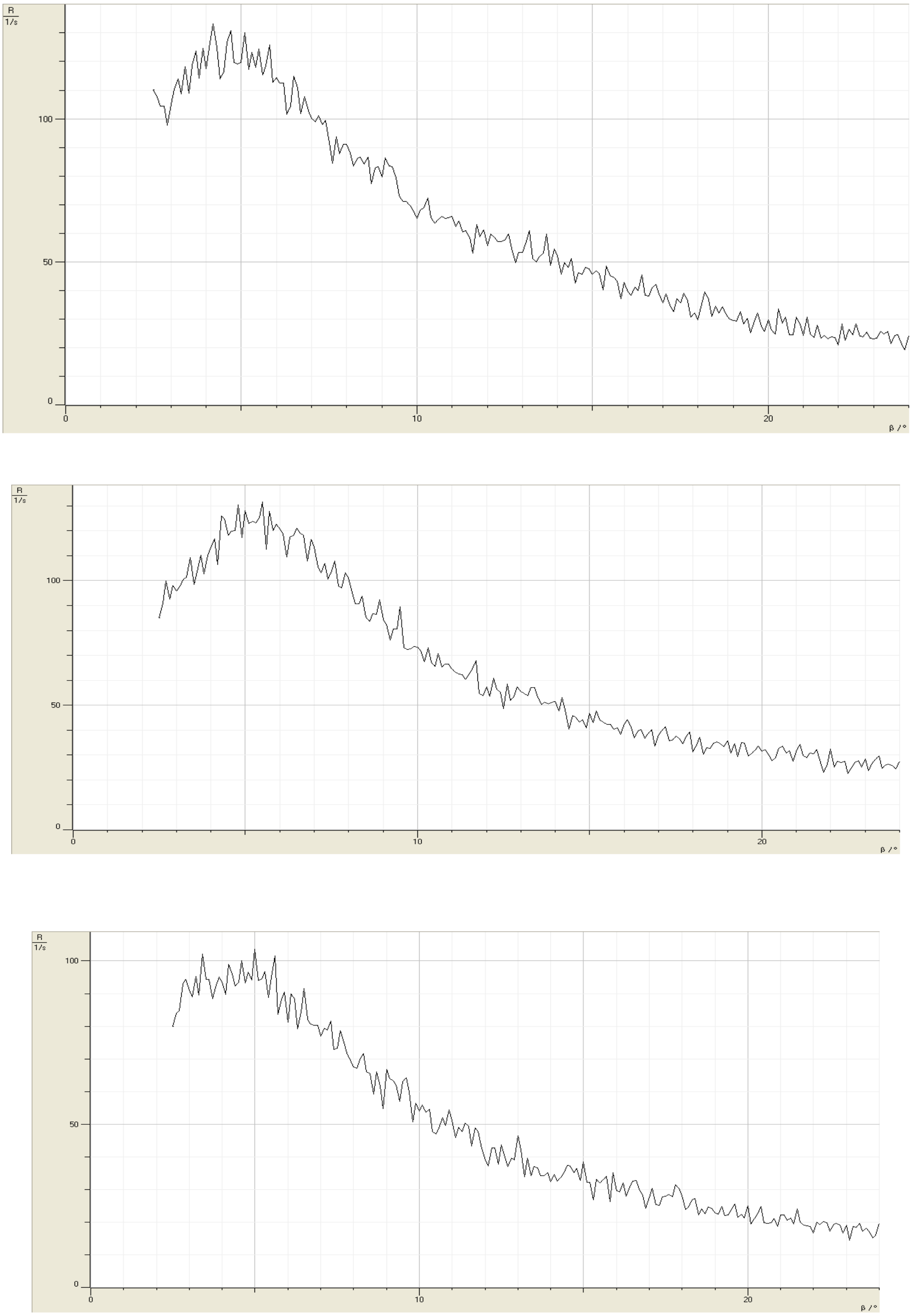

Fig.1 sample (1, 2, & 3) respectively. Roentgen /1/s against Incident x-ray angle.

Table 1. Sample One.

Angle	R/1/s	Angle	R/1/s	Angle	R/1/s	Angle	R/1/s	Angle	R/1/s	Angle	R/1/s
2.5	110.2	6.5	114.8	10.4	64.8	14.3	51.2	18.2	35.2	22.2	24.5
2.6	107.4	6.6	110.8	10.5	65.8	14.4	42.6	18.3	39.4	22.3	26.7
2.7	104.4	6.7	107.8	10.6	65.2	14.5	46.2	18.4	36.8	22.4	27.3
2.8	104.4	6.8	102.8	10.7	65.4	14.6	45.6	18.5	31.0	22.5	28.4
2.9	97.8	6.9	100.2	10.8	65.8	14.7	48.0	18.6	34.4	22.6	24.0
3.0	105.2	7.0	99.0	10.9	62.4	14.8	47.6	18.7	32.2	22.7	23.8
3.1	110.4	7.1	101.0	11.0	64.2	14.9	45.6	18.8	34.2	22.8	25.4
3.2	114.0	7.2	98.0	11.1	60.4	15.0	46.8	18.9	31.8	22.9	23.0
3.3	108.6	7.3	99.4	11.2	61.0	15.1	46.0	19.0	30.0	23.0	23.2
3.4	118.2	7.4	91.6	11.3	58.6	15.2	40.2	19.1	29.4	23.1	25.6
3.5	109.0	7.5	84.4	11.4	53.0	15.3	48.6	19.2	29.2	23.2	24.8
3.6	118.6	7.6	93.6	11.5	63.0	15.4	45.2	19.3	32.0	23.3	25.6
3.7	123.6	7.7	87.8	11.6	58.8	15.5	44.4	19.4	28.2	23.4	21.4
3.8	114.2	7.8	91.0	11.7	61.2	15.6	44.4	19.5	30.2	23.5	24.2
3.9	124.6	7.9	91.2	11.8	55.6	15.7	43.4	19.6	25.2	23.6	24.6
4.0	117.4	8.0	88.0	11.9	59.8	15.8	37.0	19.7	29.2	23.7	21.2
4.1	126.6	8.1	83.6	12.0	58.4	15.9	42.8	19.8	32.0	23.8	19.2
4.2	133.2	8.2	86.0	12.1	57.0	16.0	42.8	20.0	27.6	23.9	24.2
4.3	124.8	8.3	86.6	12.2	57.2	16.1	39.6	20.1	25.6	24.0	24.2
4.5	114.0	8.4	84.2	12.3	57.6	16.2	38.4	20.2	29.8		
4.6	116.6	8.5	86.6	12.4	59.8	16.3	41.2	20.3	26.2		
4.7	126.8	8.6	77.4	12.5	54.6	16.4	40.0	20.4	24.8		
4.8	130.8	8.7	82.8	12.6	49.8	16.5	45.4	20.5	33.6		
4.9	119.6	8.8	83.2	12.7	53.2	16.6	38.2	20.6	28.6		
5.0	119.2	8.9	79.8	12.8	53.2	16.7	38.0	20.7	30.8		
5.1	119.6	9.0	86.4	12.9	56.4	16.8	40.8	20.8	24.4		
5.2	130.2	9.1	83.2	13.0	61.0	16.9	42.0	20.9	30.6		
5.3	117.2	9.2	79.4	13.1	51.2	17.0	38.8	21.0	24.8		
5.4	123.2	9.3	73.0	13.2	50.0	17.1	35.6	21.1	23.6		
5.5	118.0	9.4	71.2	13.3	51.8	17.2	38.8	21.2	27.8		
5.6	124.4	9.5	71.2	13.4	53.0	17.3	35.0	21.3	23.2		
5.7	115.4	9.6	79.6	13.5	59.6	17.4	32.6	21.4	23.0		
5.8	118.4	9.7	68.0	13.6	48.8	17.5	37.0	21.5	23.8		
5.9	125.8	9.8	65.2	13.7	54.4	17.6	35.6	21.6	23.6		
6.0	112.8	9.9	68.0	13.8	52.0	17.7	39.0	21.7	21.0		
6.1	114.4	10.0	69.0	13.9	45.6	17.8	36.4	21.8	28.4		
6.2	112.6	10.1	72.4	14.0	49.6	17.9	30.6	21.9	22.6		
6.3	101.6	10.2	65.4	14.1	48.0	18.0	32.2	22.0	26.4		
6.4	104.4	10.3	63.6	14.2	51.2	18.1	29.8	22.1	24.6		

Table 2. Sample Two.

Angle	R/1/s	Angle	R/1/s	Angle	R/1/s	Angle	R/1/s	Angle	R/1/s	Angle	R/1/s
2.5	85.0	6.5	118.2	10.4	73.2	14.3	53.0	18.2	37.2	22.2	27.0
2.6	91.0	6.6	121.0	10.5	67.2	14.4	46.8	18.3	30.4	22.3	27.4
2.7	99.8	6.7	119.0	10.6	65.6	14.5	40.4	18.4	32.8	22.4	22.6
2.8	92.6	6.8	118.2	10.7	70.8	14.6	45.8	18.5	32.6	22.5	25.0
2.9	98.0	6.9	107.8	10.8	65.4	14.7	45.2	18.6	34.6	22.6	27.0
3.0	95.8	7.0	116.6	10.9	66.4	14.8	43.2	18.7	33.4	22.7	27.8
3.1	97.6	7.1	113.4	11.0	66.4	14.9	44.2	18.8	35.8	22.8	25.2
3.2	100.6	7.2	105.6	11.1	64.6	15.0	41.0	18.9	30.8	22.9	28.4
3.3	101.4	7.3	103.2	11.2	63.2	15.1	46.8	19.0	34.6	23.0	23.8
3.4	109.2	7.4	107.0	11.3	62.6	15.2	43.0	19.1	29.4	23.1	28.2
3.5	98.4	7.5	100.6	11.4	60.4	15.3	47.8	19.2	35.0	23.2	29.6
3.6	103.6	7.6	103.8	11.5	62.4	15.4	44.0	19.3	34.8	23.3	24.6
3.7	110.2	7.7	107.8	11.6	64.6	15.5	43.2	19.4	29.6	23.4	26.0
3.8	102.8	7.8	97.8	11.7	68.0	15.6	42.4	19.5	30.6	23.5	26.4
3.9	110.2	7.9	97.0	11.8	54.8	15.7	42.2	19.6	32.0	23.6	25.6
4.0	113.2	8.0	103.2	11.9	53.8	15.8	40.4	19.7	33.6	23.7	24.5
4.1	116.8	8.1	101.0	12.0	57.4	15.9	41.0	19.8	31.4	23.8	24.3
4.2	106.4	8.2	95.2	12.1	53.6	16.0	38.2	20.0	32.2	23.9	24.4
4.3	126.0	8.3	90.6	12.2	60.8	16.1	44.2	20.1	30.0	24.0	27.6
4.5	124.8	8.4	90.8	12.3	56.4	16.2	41.2	20.2	27.8		
4.6	118.2	8.5	93.8	12.4	55.2	16.3	37.0	20.3	29.0		
4.7	119.8	8.6	85.2	12.5	48.6	16.4	39.8	20.4	32.6		
4.8	120.2	8.7	83.6	12.6	58.4	16.5	40.2	20.5	33.6		
4.9	130.4	8.8	86.6	12.7	52.0	16.6	36.6	20.6	30.8		
5.0	117.2	8.9	86.4	12.8	53.6	16.7	38.6	20.7	31.8		
5.1	128.0	9.0	92.4	12.9	57.4	16.8	40.2	20.8	27.4		

5.2	123.0	9.1	84.4	13.0	55.4	16.9	33.6	20.9	31.6		
5.3	123.8	9.2	82.6	13.1	54.8	17.0	38.0	21.0	34.4		
5.4	123.2	9.3	76.2	13.2	53.8	17.1	39.8	21.1	29.8		
5.5	125.2	9.4	80.6	13.3	57.0	17.2	41.4	21.2	28.8		
5.6	131.6	9.5	80.6	13.4	57.0	17.3	35.8	21.3	30.8		
5.7	112.6	9.6	89.6	13.5	53.4	17.4	36.0	21.4	30.6		
5.8	127.8	9.7	73.2	13.6	50.4	17.5	37.6	21.5	32.2		
5.9	120.2	9.8	72.4	13.7	51.2	17.6	36.6	21.6	27.0		
6.0	122.6	9.9	72.6	13.8	50.6	17.7	34.6	21.7	23.0		
6.1	120,8	10.0	73.6	13.9	51.2	17.8	37.4	21.8	26.4		
6.2	118.6	10.1	73.4	14.0	51.4	17.9	39.2	21.9	23.4		
6.3	109.6	10.2	71.8	14.1	47.8	18.0	31.2	22.0	25.2		
6.4	117.6	10.3	67.4	14.2	53.0	18.1	34.0	22.1	27.4		

Table 3. Sample Three.

Angle	R/1/s	Angle	R/1/s	Angle	R/1/s	Angle	R/1/s	Angle	R/1/s	Angle	R/1/s
2.5	80.0	6.5	84.4	10.4	54.6	14.3	33.6	18.2	26.8	22.2	20.2
2.6	84.0	6.6	91.6	10.5	47.8	14.4	35.0	18.3	27.2	22.3	19.8
2.7	84.8	6.7	82.2	10.6	47.0	14.5	37.4	18.4	22.2	22.4	17.2
2.8	92.8	6.8	80.6	10.7	48.8	14.6	37.2	18.5	24.0	22.5	19.2
2.9	94.4	6.9	80.2	10.8	52.0	14.7	35.2	18.6	22.6	22.6	19.6
3.0	91.0	7.0	80.2	10.9	49.6	14.8	36.4	18.7	24.6	22.7	19.0
3.1	89.0	7.1	77.0	11.0	54.4	14.9	32.8	18.8	24.2	22.8	16.6
3.2	89.0	7.2	79.4	11.1	51.0	15.0	38.4	18.9	22.8	22.9	19.0
3.3	95.2	7.3	78.8	11.2	45.8	15.1	32.2	19.0	22.4	23.0	14.4
3.4	89.6	7.4	81.6	11.3	49.0	15.2	32.2	19.1	24.8	23.1	18.6
3.5	102.2	7.5	72.8	11.4	47.8	15.3	26.8	19.2	22.0	23.2	18.4
3.6	94.4	7.6	73.2	11.5	50.4	15.4	32.2	19.3	22.2	23.3	19.6
3.7	94.4	7.7	78.6	11.6	49.4	15.5	33.2	19.4	23.8	23.4	17.2
3.8	88.4	7.8	75.2	11.7	43.2	15.6	34.0	19.5	25.6	23.5	18.2
3.9	92.0	7.9	71.8	11.8	48.8	15.7	26.2	19.6	21.4	23.6	17.2
4.0	95.0	8.0	69.6	11.9	47.8	15.8	35.2	19.7	22.4	23.7	17.0
4.1	93.6	8.1	67.6	12.0	42.6	15.9	29.6	19.8	21.2	23.8	16.0
4.2	89.8	8.2	67.2	12.1	39.0	16.0	29.2	20.0	25.0	23.9	16.0
4.3	99.0	8.3	69.8	12.2	37.2	16.1	32.0	20.1	19.4	24.0	19.6
4.5	96.0	8.4	71.6	12.3	42.8	16.2	28.0	20.2	21.6		
4.6	92.4	8.5	66.0	12.4	37.8	16.3	30.8	20.3	24.8		
4.7	93.4	8.6	65.4	12.5	43.6	16.4	32.6	20.4	19.8		
4.8	100.0	8.7	59.2	12.6	39.8	16.5	32.8	20.5	19.6		
4.9	93.2	8.8	66.0	12.7	37.0	16.6	30.2	20.6	19.8		
5.0	94.2	8.9	61.6	12.8	39.6	16.7	28.2	20.7	21.0		
5.1	103.6	9.0	54.8	12.9	39.0	16.8	24.2	20.8	18.0		
5.2	94.0	9.1	66.8	13.0	46.4	16.9	27.6	20.9	22.2		
5.3	94.6	9.2	64.0	13.1	42.2	17.0	30.4	21.0	22.2		
5.4	96.8	9.3	63.2	13.2	33.8	17.1	25.4	21.1	20.6		
5.5	88.8	9.4	62.0	13.3	39.6	17.2	25.2	21.2	21.2		
5.6	95.0	9.5	57.0	13.4	34.2	17.3	27.8	21.3	19.4		
5.7	101.6	9.6	63.0	13.5	37.0	17.4	28.0	21.4	24.0		
5.8	83.6	9.7	64.2	13.6	36.6	17.5	28.4	21.5	20.0		
5.9	88.2	9.8	60.0	13.7	34.2	17.6	27.8	21.6	19.0		
6.0	90.4	9.9	50.6	13.8	34.2	17.7	31.4	21.7	18.8		
6.1	81.2	10.0	56.4	13.9	35.2	17.8	30.4	21.8	18.6		
6.2	90.0	10.1	54.0	14.0	32.4	17.9	28.2	21.9	16.6		
6.3	88.4	10.2	55.8	14.1	34.6	18.0	23.8	22.0	20.0		
6.4	79.2	10.3	53.6	14.2	32.6	18.1	24.6	22.1	19.2		