Available online www.jsaer.com

***Journal of Scientific and Engineering Research*, 2019, 6(7):94-96**

Research Article

ISSN: 2394-2630
CODEN(USA): JSERBR

The Effect on Magnetic Field Induction Coils on Nano-Particles of Iron Fillings

Mohmed Awedalkarem Hajahmed[1], Sawsan Ahmed Elhouri Ahmed[2], Mubarak Dirar Abdallah[3]

[1]Sudan University of Science & Technology-College of Science-Department of Physics- Khartoum- Sudan
[2]Sudan University of Science &Technology-College of Science-Department of Physics & International University of Africa- College of Science- Department of Physics- Khartoum-Sudan
[3]University of Bahri - College of Applied & Industrial Sciences, Department of Physics - Khartoum - Sudan

Abstract In this work we carried and experiment consist of three different coils (100, 150 and 200 turns) of U-shaped test tube. Samples consist of raw materials of iron Fe_2O_3 purity 80 % investigated chemically were crushed at four different intervals of times(2,6,and 10 minute) were placed within the magnetic field induction. The relation between the current (I) and magnetic field induction values four times was calculated.

Keywords Magnetic Field, Induction Coils, Nano-Particles, Iron Fillings

Introduction

A nanometer (nm) is one thousand millionth of meter. For comparison, a single human hair is about 80,000 nm wide, a red blood cell is approximately 7,000 nm wide and water molecule is almost 0.3 nm across. People are interested in the nano-scale (which we define to be from 100nm down to the size of atoms (approximately 0.2nm)) because it is at this scale that the properties of materials can be very different from those at a larger scale. We define nano-science as the study of phenomena and manipulation of materials. At atomic, molecular and macromolecular scales, where properties differ significantly from those at a larger scale; and nanotechnologies as the design, characterization, production and application of structures, devices and systems by controlling shape and size at the nano-meter scale. In some senses, non-science and nano-technologies are not new. Chemists have been making polymers, which are large molecules made up of nano-scale subunits, for many decades and nano-technologies have been used to create the tiny features on computer chips for the past twenty years. However, advances in the tools that now allow atoms and molecules to be examined and probed with great precision have enabled the expansion and development of nano-science and nano-technologies. The properties of materials can be different at the nano-scale for two main reasons. First, nano-materials have a relatively larger surface area when compared to the same mass of material produced in a larger form. This can make materials more chemically reactive (in some cases materials are inert in their larger form are reactive when produced in their nano-scale form), and affect their strength of electrical properties. Second, quantum effects can begin to dominate the behavior of matter at nano-scale, particularly at the lower end, affecting the optical, electrical and magnetic behavior of materials.

Materials can be produced that are nano-scale in one dimension (example, very thin surface coatings), in two dimensions (example, nano-wires and nano-tubes) or in all three dimensions (example nano-particles) [1,2].

Material & Method

Step One-Experiment preparations

*Three different coils (100, 150 and 200 turns) of U-shaped test tube.

*Crushed samples of Fe_2O_3 purity 80 % at different time intervals (2, 6, and 10 minute).

Step Two-Method

Samples were placed within the magnetic field induction area and the following readings were taken.

Results

Table 1: Different time intervals crushing at 200 turn coil

I (A)	B(mT) - 2min	B(mT) - 6min	B(mT) - 10min
0	**-1.12**	**-1.09**	**-1.12**
0.3	-1.05	-0.91	-1.05
0.6	-0.88	-0.79	-0.92
0.9	-0.64	-0.50	-0.74
1.2	-0.52	-0.33	-0.30
1.5	-0.30	0.00	0.04
1.8	-0.04	0.27	0.53
2.1	0.15	0.60	0.66
2.4	0.50	0.86	1.29

Table 2: Different time intervals crushing at 150 turn coil

I (A)	B(mT) - 2min	B(mT) - 6min	B(mT) - 10min
0	-0.09	-1.23	-1.15
0.3	-1.03	-1.09	-1.1
0.6	0.00	-0.87	-0.90
0.9	0.15	-0.77	-0.64
1.2	0.21	-0.54	-0.48
1.5	0.30	-0.43	-0.30
1.8	0.47	-0.19	-0.27
2.1	0.58	0.26	-0.13
2.4	0.67	0.32	1.07

Table 3: Different time intervals crushing at 100 turn coil

I (A)	B(mT) - 2mi	I(A)	B(mT)-6min	I(A)	B(mT) -10min
0	-1.23	0	-1.18	0.023	-1.14
0.3	-1.07	0.27	-1.09	0.27	-1.1
0.6	-0.93	0.6	-0.89	0.7	-1.02
0.9	0.79-	0.83	-0.87	1.11	-0.93
1.2	-0.63	1.08	-0.73	1.44	-0.87
1.5	-0.41	1.34	-0.60	1.78	-0.80
1.8	0.20-	1.86	-0.33	2.05	-0.78
2.1	0.084	2.18	-0.097	2.33	-0.74
2.4	0.32	2.38	0.009	2.72	0.72-

Conclusion & Discussion

Table (1) with number of 200 turns g shows increases of the magnetic field induction; due to reduces of the volume of iron fillings while table (2) and (3) using different number of turns 150 and 100 show that the magnetic field induction is higher at lower time interval of crashing.

Noticed here the size is largest.

Notes

At table three the ammeter readings were so unstable and very much different form table (1) and table (2) so there were columns of different current (I) values stands for different time intervals of crushing.

The size of nano-particles affects the magnetic field induction and its properties. So the different nano sized particle can be used in different applications.

References

[1]. Arati G. Kolhatkar, Andrew C. Jamison, Dmitri Livinov, Richard C. Willson and T. Randall Lee, Tuning the Properties of Nano-Particles, 2015

[2]. Guidance for the Management and Assessment of Nano-materials in Research Curtin University 2017.