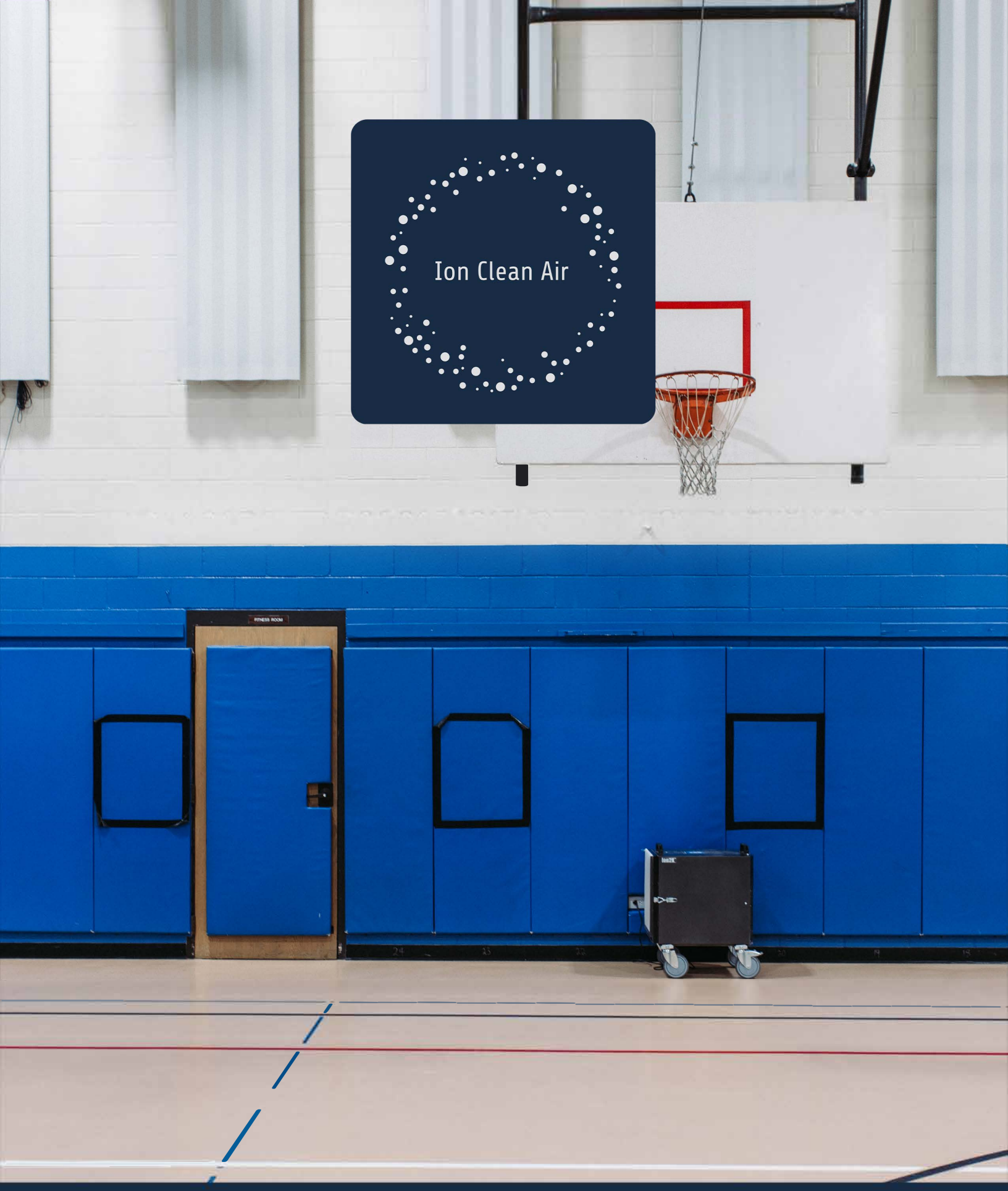

ioncleanair.com | 800.245.0267

The spread of COVID-19 over the last few months highllights the need to provide solutions for the long- term improvement of the quality of air we breathe. This means removing allergens, dust, and pathogens from our environment. Bipolar air ionizers are unique in their capacity to provide rapid and simple removal of these contaminants.

Ionizers are compact, portable machines that electronically charge the air in the room driving particulates to the ground and out of the air. These machines positively & negatively charge ion particles in the natural environment driving silica, asbestos and airborne influenza viruses to the ground.

- Portable Ionizers are ideal solutions for any enclosed room:
  - Classrooms
  - Offices
  - Meeting Rooms
  - Cafeterias
  - Libraries
  - Data Rooms and more

The benefits of bipolar ionization have been known to drive aerosolized viral influenza pathogens out of the breathable air and down to the ground thanks to a 2015 study, conducted by the National Institute of Health
(link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4477231/).

Most recently, ionizers have been tested to determine their ability to combat SARS-CoV-2, which is the viral strain that causes the COVID-19 disease in humans. In the Aviation Clean Air Report, which was published on June 2, 2020, the study determined that bipolar ionization can achieve a 99.4% reduction rate of the SARS-CoV-2 within 30 minutes. Details of this report, conducted by Innovative Bioanalysis and commissioned by Aviation Clean Air, in the appendix of this informational deck.

In short, ionizers are an effective way to rid breathable air of harmful pollutants, contaminants, and viral pathogens. Ions are naturally occurring and have no harmful side effects on humans, pets, or the environment.

The Ion1K and the Ion4K™ represent unique technology, supported by science, that can provide businesses and households with cleaner air.

Ion Clean Air

Ionizer FAQ

Is the Ionizer safe?

Ionizers are completely safe and produce no ozone or other dangerous byproducts.

How is it powered?

Any standard wall outlet will work. The enclosed IEC plug ensures it will work globally as well.

How big is the Ionizer?

The smallest is roughly the size of a microwave, and the largest is about twice that size.

Is there any maintenance?

Every 6 months there are 2 filters that should be swapped out to ensure optimal performance. These filters easily slide in and out of the machine, and can be purchased at IonCleanAir.com.

Is it hard to set up?

It's as simple as flipping a switch to turn it on and adjusting the fan to your preferred speed.

What size space will this work in?

Our smallest ionizer is appropriate for up to approximately 15,000 ft cubed and increases from there, up to a capacity of roughly 70,000 ft cubed.

Specifications

	Ion1K	Ion4K
Width	14.5"	20.5"
Height	19.7"	28.7"
Length	22.8"	24.4"
Weight	40 lb	132.3 lb
Power	110V, Single Phase	110V, Single Phase
Capacity	up to 14,100 ft cubed	up to 53,000 ft cubed

Ionizer Ozone Production Analysis

Test Results

Successful testing resulted in no significant increase in the ozone levels being observed at the fan outlet of the ionization unit, compared to the background ozone level in the room (that were in the range of 10-15 ppb). The registered ozone variations during the one hour test were less than 1 ppb. Thus, no ozone production could be measured during the test.

Objective

RISE was commisioned to test the product, in respect of any ozone production from the unit during use.

Methods

The air ionization unit was connected to 230V AC, and an active (negative) ion production was demonstrated, by means of an ion meter supplied by the client.

To measure any ozone production from the test item, an ozone meter (2BTech, model 205) calibrated 5th of October 2017, was used. (RISE inventory BX80761)

By means of a PTFE tubing, air was sucked from the outlet of the air ionization unit, next to the fan, to the ozone instrument. (The tubing has been used for several years for ozone measurements and could be considered free from any ozone reduction). The ozone instrument is equipped with a data logger to register the ozone level, averaging the signal once a minute in this case.

Constantly running the air ionization unit, the levels of ozone was measured for a period of approximately one hour.

INNOVATIVE BIOANALYSIS
creating solutions | getting results

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SARS-CoV-2 Neutralization by Ionization

CLIENT: ACA/IAE

PROJECT: Bipolar Ionization system applied to COVID19

PRODUCT: ACA-RN-001 and ACA4800GU-1
CAP LIC NO: 9501843
CLIA LIC NO: 05D1064850

SAMPLE RECEIVED: 05/21/2020
START DATE: 05/27/2020
REPORT DATE: 06/02/2020
CHALLENGE VIRUS: SARS-CoV-2

EXPERIMENTAL SUMMARY:

Single RE22 control chambers set on a table stainless steel table with pressure verification seals. Internal working dimensions 16.5"W x 9"H x 12"D for a total cubic footage of 1.031. Under initial observation it was determined to seal the unit completely with no intake or exhaust port. Control ionization counts were performed prior to initial test. Testing and control were conducted in an average ambient temperature of 72.6 degrees Fahrenheit.

A singular fan unit was set up at a 45-degree angle to the two ionization units affixed to the testing chamber. The initial control fan speed was measured at an average of 870 Ft/m. At these airflow speeds the initial ionization saturation counts were taken so adjustment could be made to lower or raise ionization levels depending on the testing parameters needed. Under the original control section, the primary fan was set 10 inches away from ion production unit A and the average air flow speed past the ion producing nodes was 250Ft/m

Under the original control section, the primary fan was set 13 inches away from ion production unit B and the average air flow speed past the ion producing nodes was 240Ft/m. Initial observations indicated large fluctuations of ions throughout the interior of the testing chamber based in the airflow. With unit B running the Ion count fluctuated from 800 thousand ions per cubic centimeter in the center of the testing chamber directly below the ionization unit to 152 thousand ions per cubic centimeter at the exterior edges of the testing chamber.

Initial observations indicated large fluctuations of ions throughout the interior of the testing chamber based in the airflow. With unit A running the Ion count fluctuated from 1.8 million ions per cubic centimeter in the center of the testing chamber directly below the ionization unit to 600 thousand ions per cubic centimeter at the exterior edges of the testing chamber.

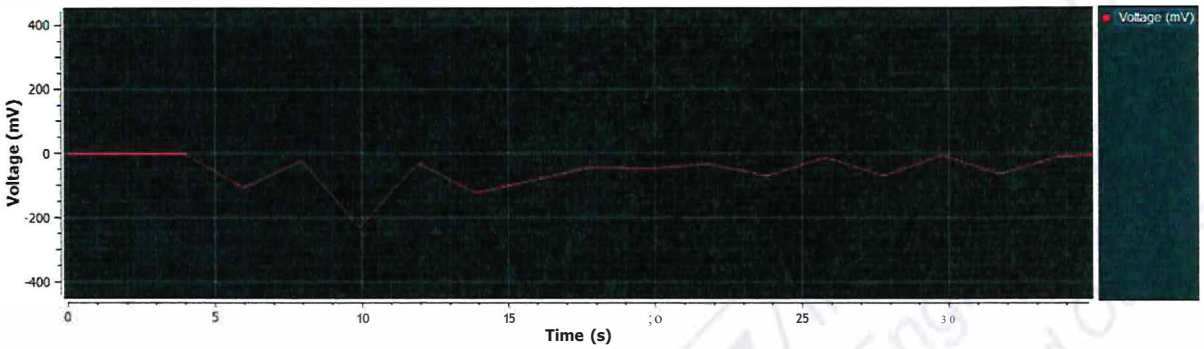
When looking at initial overall Ion situation of an open area with a controlled airflow we observed the below graph range. Ion count recorded in the 100 thousand range when.

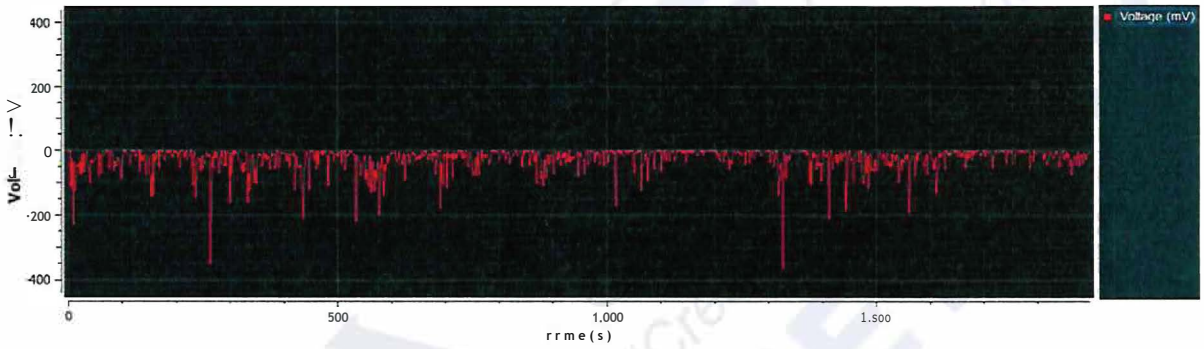
	1	2	3
Ft/m	230	330	380
FT	ION	ION	ION
4'	630	1100	1400
7'	250	240	380
11'	92	143	170
15'	21	40	arc
19'	6	24	arc
24'	6	18	9
46'			5

After control samples were completed for saturation levels a slower moving fan was introduced to lessen the airflow across the Ionization nodes to reduce the overall Ion concentration levels to something more similar to conditions found inside a standard aircraft when running the ion cleaning system. Based on historical observations the standard Ion count inside aircrafts was 10,000 – 50,000 ions per cubic centimeter. With the slower fan speed and slightly altered angle the average negative ion count inside the test chamber was reduced to an average of 27 thousand per cubic centimeter for the viral testing phase.

During viral sample testing the viral chamber had one continual ionization sensor document the overall ion counts and logged for the course of the test. The average Ion count within the testing chamber at point of viral placement was -27.2307 (+_ 10,000) cm3. Viral cultures added to test chamber in independent sealable dishes. The initial test the ionizations units were ran for 30 minutes. Each viral sample was sealed at a pre-determined time. Sample A sealed up after 10 minutes of Ion exposure. Sample B sealed after 15 minutes of ion exposure. Sample C sealed up after 30 min of Ion exposure. After final sample was sealed the samples were removed from testing chamber and transferred to lab staff for further testing.

Attached is the continual time points for test on the minute as well as a constant graph of ion levels in the test chamber. Recommended further testing with various times and concentrations of ion levels in the atmosphere.





Secondary wave of tests recommended aerosol product upon confirmation of safety review.

Upon test results data completion determine safety of using 8x20x8 containment pod for large scale control testing.

PROCEDURE:

VIRUS: SARS-CoV-2

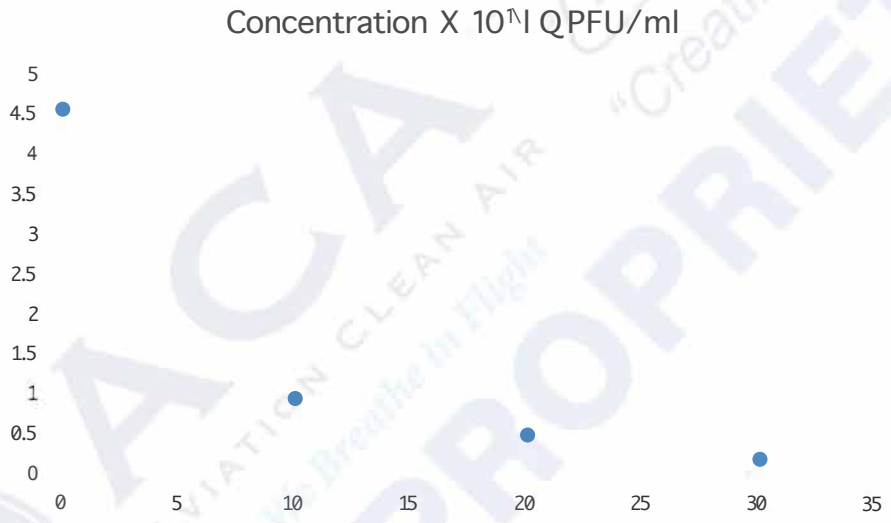
Nasopharyngeal swabs were collected on day 4 post symptom onset, placed in 2–3 mL of viral transport medium, used for molecular diagnosis, and frozen. Vero CCL-81 cells were cultured in Dulbecco minimal essential medium (DMEM) supplemented with heat-inactivated fetal bovine serum (5% or 10%) and antibiotics/antimycotics. For isolation, limiting dilution, and passage 1 of the virus, 50 µL of serum-free DMEM was pipetted into columns 2-12 of a 96-well tissue culture plate. Then 100 µL of clinical specimens pipetted into column 1 and serially diluted 2-fold across the plate. Then trypsinized and resuspended Vero cells in DMEM containing 10% fetal bovine serum, 2x penicillin/streptomycin, 2x antibiotics/antimycotics, and 2x amphotericin B at a concentration of 2.5×10^5 cells/mL. 100 µL of cell suspension added directly to the clinical specimen dilutions and mixed gently by pipetting. The inoculated cultures were grown in a humidified 37°C incubator in an atmosphere of 5% CO_2 and observed for cytopathic effects (CPEs) daily.

INNOCULATION OF THE TEST CARRIER:

Sterile sealable dishes were coated with 1 m l viral suspension containing samples with a viral titer of 4.4 X lQ^10 PFU/ml crude SARS-CoV-2 virus. Using the Poisson distribution, one would determine the TCID50 value would be equivalent to roughly .7 X PFU/ml or 3.8 X 10^10 TCID50/ml

EFFICACY TESTING:

Viral media with a known concentration of Plaque Forming Units was applied to a sterile static dish composed of polystyrene plastic and individually sealable and exposed to bipolar ionization for a period of 10, 15, and 30 minutes. Swabs were taken of all plates and cultured by the same means as the original nasopharyngeal swab culture. Based on viral titrations it was determined that at 10 minutes 84.2 % of the virus was inactivated, at 15 minutes 92.6% of the virus was inactivated, and at 30 minutes 99.4% of the virus was inactivated.



CONCLUSIONS/OBSERVATIONS:

Based on the results listed above, it can be determine that hydrolysis via positively charged hydrogen ions binding to peplomers of the SARS-CoV-2 virus can render 99.4 % or viral particles are inactivated on a stagnant surface at 30 minutes. The ionization technology allows for the saturation of hemagglutinin with hydroxyl groups effectively inactivating the hemagglutinin receptors and rendering the virus ineffective and eliminating its ability to bind to and infect cells. Initial testing has demonstrated the ionizers ability to neutralize pathogen, namely SARS-CoV-2, on a static surface. Further studies are required for reproducibility testing as well as variation in environment and environmental factors.

Disclaimer:

03 JUN 2020

Dr. Dana Yee M.D Medical Director **Date**

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06/06/2020 11:52:25 am

06/03/2020

Sam Kabbani, MS, BS, MT(ASCP), CLS
Chief Scientific Officer, Innovative Bioanalysis **Date**

6/02/2020

Albert Brockman
Director of Biosafety, Lead Biosafety Officer **Date**